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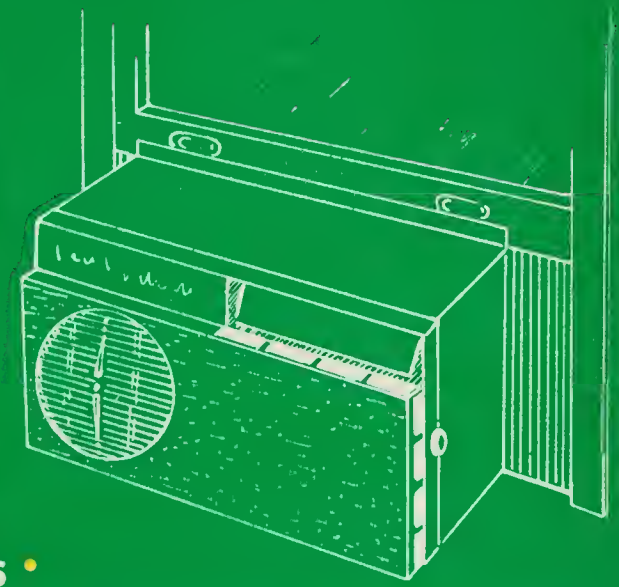
Simple, illustrated, step-by-step procedures for fixing the most frequently encountered problems occurring in: automatic washing machines, clothes dryers (gas or electric), refrigerators and refrigerator-freezers, room (window) air conditioners, and automatic dishwashers

by Michael Squeglia



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by Michael Squeglia

Illustrated by Carl Bryant
and
Eleanor Malara Isenberg

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ALL ABOUT REPAIRING MAJOR HOUSEHOLD APPLIANCES

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Contents

Preface

This book identifies many of the common problems that occur in major home appliances. It examines malfunctions that are most often found in automatic washing machines, clothes dryers, refrigerators, freezers, room (window) air conditioners, and automatic dishwashers. The solutions to these problems are provided in numbered sections called "problem solvers."

As in my first book, *All About Repairing Small Appliances,* I have outlined each repair procedure in simple step-by-step easy-to-follow instructions. These procedures provide the practical "know-how" needed to restore operation to and to prolong the useful life of appliances. Each repair can mean substantial dollar savings. Equally important, this book will serve as a guide for determining when the services of a professional appliance technician are required.

There is an abundance of large, simple line drawings carefully matched with those repair steps that need visual aid. Each "problem solver" should be read through completely to establish continuity before beginning any adjustment or repair. Every hazard has been anticipated to insure the safety of the person attempting the repair against injury and to protect the appliance against further damage.

The repairs are simple and easily made. Naturally, any appliance being worked on should be unplugged. Any complex repairs or those involving any possible risk must clearly be referred to the attention of a qualified appliance repair technician.

All the tools and materials needed to complete an adjustment or repair are listed in each "problem solver." Again as in my first book, I have recommended that most of the tools and materials required be of the familiar household variety. Two glossaries are provided: one to introduce and illustrate less familiar tools, and the other to familiarize the reader with the meanings of common appliance terminology.

ALL ABOUT REPAIRING MAJOR HOUSEHOLD APPLIANCES

Section I

Repair Problems and Their Solutions

Problem Solver #1

APPLIANCE: Automatic Clothes Washers

PROBLEM: **Hot or cold water flow is too slow.**

EXPLANATION: An adequate supply (flow rate) of both hot and cold water is an essential requirement for automatic washing machines. Insufficient water flow is usually caused by a restriction in either or both the hot and cold water inlet hoses.

TOOLS AND MATERIALS NEEDED:

(a) a universal pliers

(b) a small screwdriver

(c) two combination hose washer-filter screens (may be purchased at any major appliance service repair shop)

SOLUTION:

1. Check the water valves of both the hot and cold water faucets to make sure they are fully open. *(Figure 1)*

2. Carefully examine the flexible (rubber) supply hoses located behind the washer for kinks. *(Figure 2)* Hoses must appear round along their entire lengths. If either hose is kinked, reposition the hose to prevent it from bending sharply. *(Figure 2)*

   NOTE: Hose kinks are sometimes produced when the washing machine is positioned too close to the wall. In such cases, moving the washer away from the wall slightly will prevent further hose kinks.

3. If hoses are not kinked, the filter screens located inside the water supply hoses should next be checked to see if they are clogged.

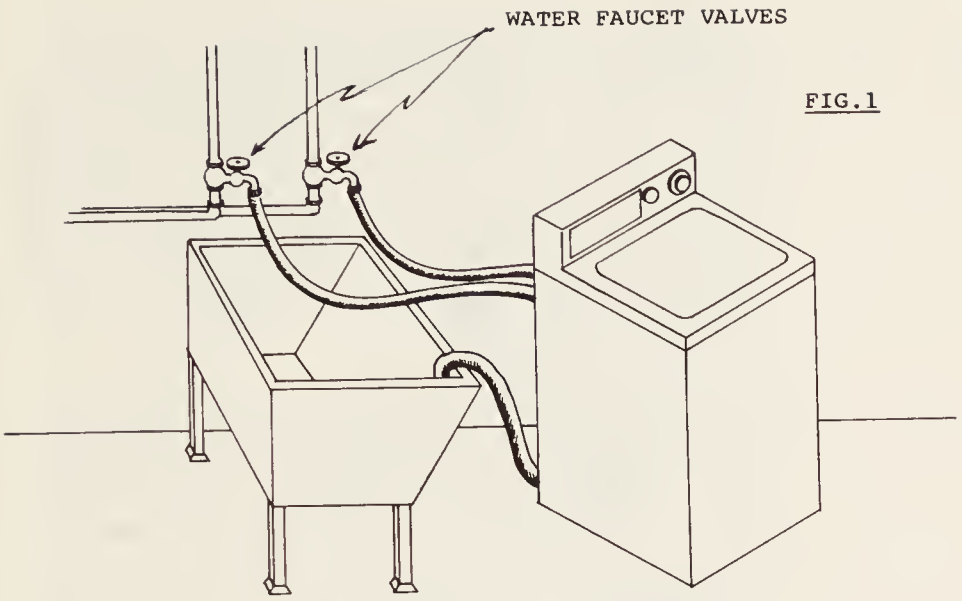

WATER FAUCET VALVES

FIG.1

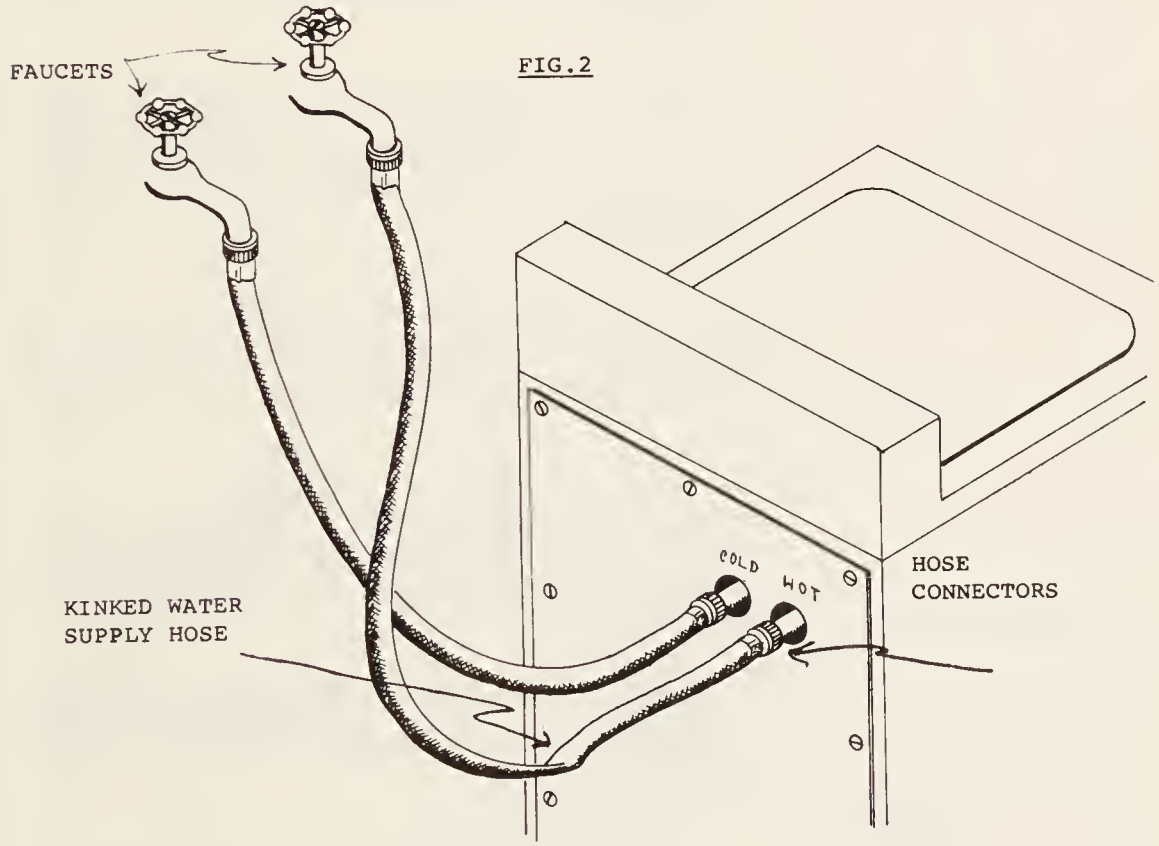

FAUCETS
COLD
HOT
HOSE
CONNECTORS
KINKED WATER
SUPPLY HOSE

FIG.2

SPECIAL NOTE: Filter screens are installed in water supply line hoses to trap small solid particles, usually rust and minerals, that are in the water. If not for the filter screens, these particles could enter the water mixing valve of the washing machine and cause it to malfunction. In time, a sufficient quantity of these particles may accumulate on the filter screens and clog them. Clogged filter screens will drastically reduce the flow of water to the washing machine.

4. To locate the filter screens, follow the rubber water supply hoses from the faucets to the point where they attach to the washing machine. *(Figure 2)* The filter screens are normally located (inside) directly behind the hose connectors and should be removed to be checked.

5. To remove the filter screens, first shut off the water faucet valves, then remove the hoses at the place where they connect with the washing machine.

6. To remove the hoses, grasp each hose connector, in turn, with a pair of pliers and turn it counter-clockwise until it is detached. *(Figure 3)*

NOTE: Mark the hoses before removing them to make certain that they will be replaced correctly on their respective hot and cold mixing valve water inlet ports.

7. Locate the filter screen in either the hose connector or in the inlet port of the water mixing valve. *(Figure 4)*

8. Pry the filter screen out with the blade of a small screwdriver. *(Figure 4)*

FIG.3

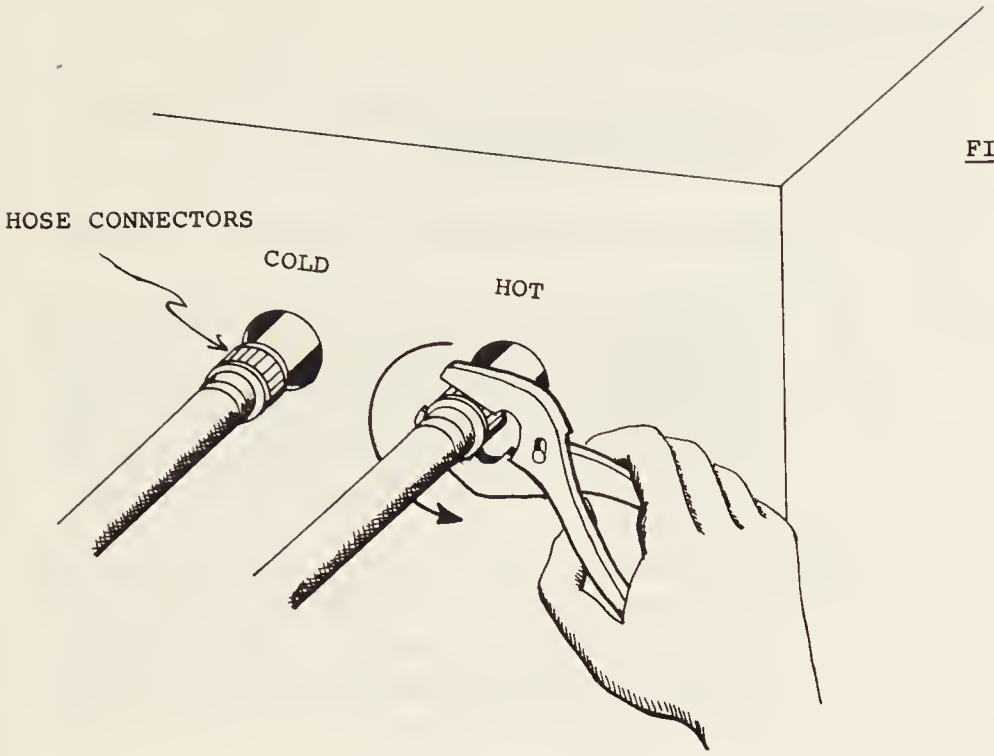
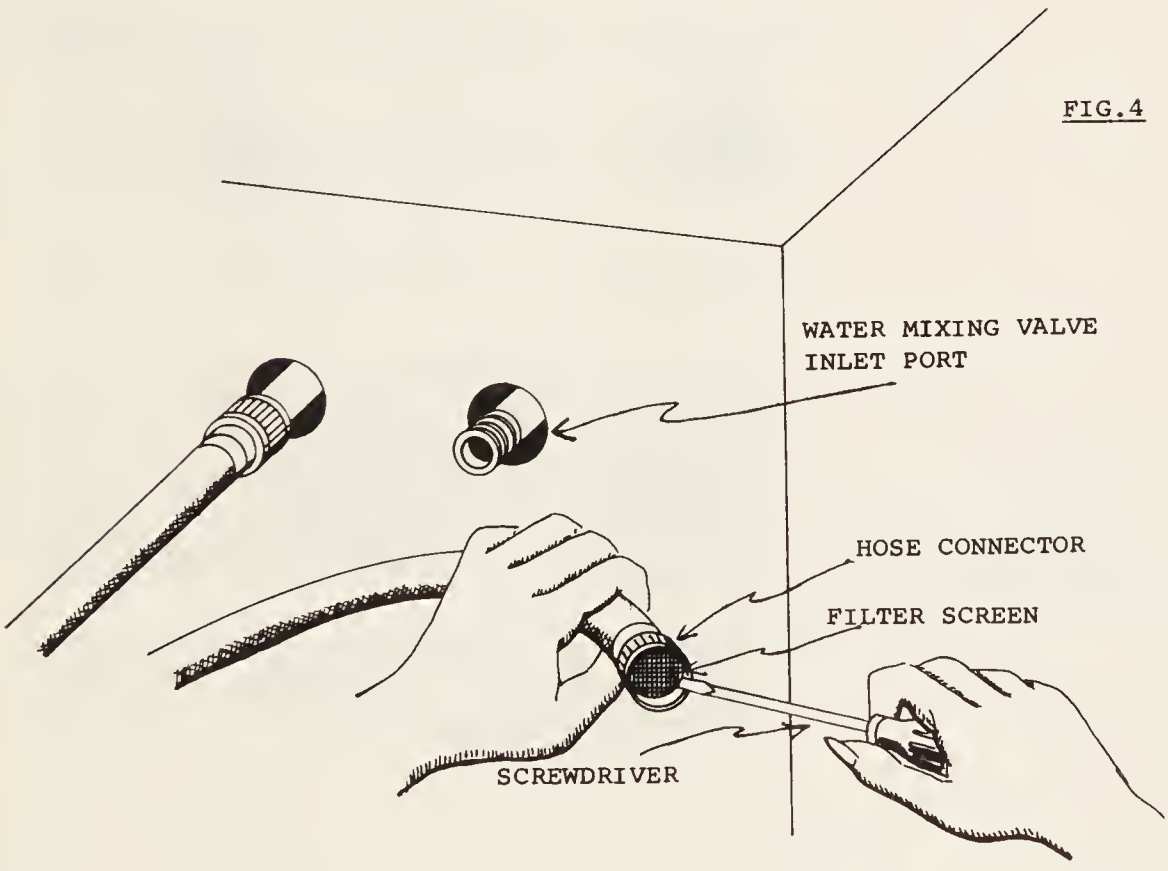

HOSE CONNECTORS
COLD
HOT

FIG.4


WATER MIXING VALVE
INLET PORT
HOSE CONNECTOR
FILTER SCREEN
SCREWDRIVER

9. Hold the filter screen up to a light to see if it is clogged. *(Figure 5)*

10. Replace clogged filter screens with new ones.

    NOTE: Either of two types of filter screens may be encountered. One type is simply a filter screen, the second (more commonly used) is a combination hose washer and filter screen. *(Figure 6)* It is best to use the combination washer-filter screen type regardless of which type was previously used.

11. To replace the filter screen, first remove the old rubber washer located in the hose connector and discard it. Stuck washers may be removed by prying them free with the blade of a screwdriver. *(Figure 7)*

12. Insert the new washer-filter screen (cone side toward the machine) into the hose connector. Screw the cold water hose connector clockwise onto the cold water mixing valve port by hand and tighten it lightly with a pair of pliers.

13. Repeat the step above for the hot water hose.

    CAUTION: Do not tighten hose connections with pliers until you are certain they are properly threaded and fully tightened by hand. Do *not* overtighten hose connections. Make sure that the hot and cold water hoses are correctly replaced onto their respective hot and cold water inlet ports of the mixing valve.

14. Recheck hose connections during machine operation for water leaks. Retighten hose connectors with pliers if necessary.

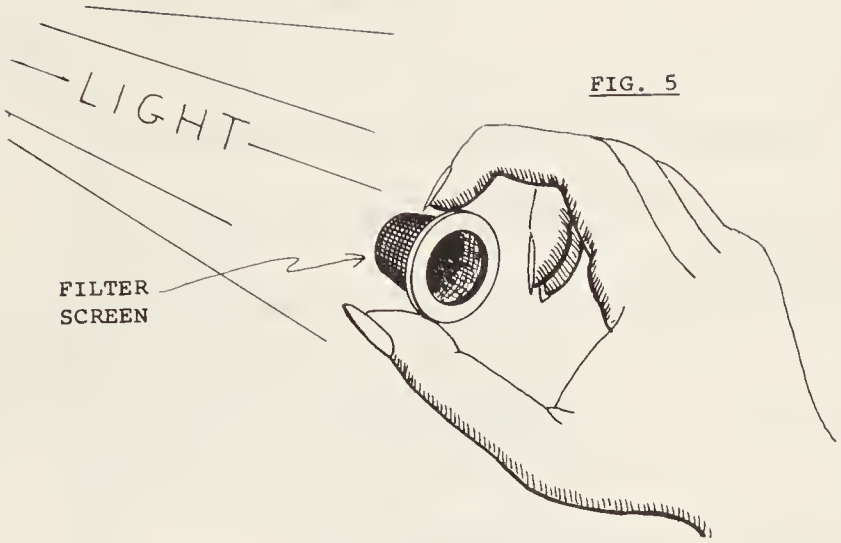
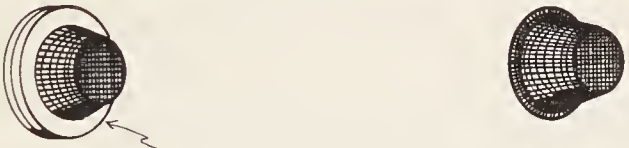


FIG. 5

COMBINATION TYPE
WASHER-FILTER SCREEN

SIMPLE FILTER SCREEN

FIG.6



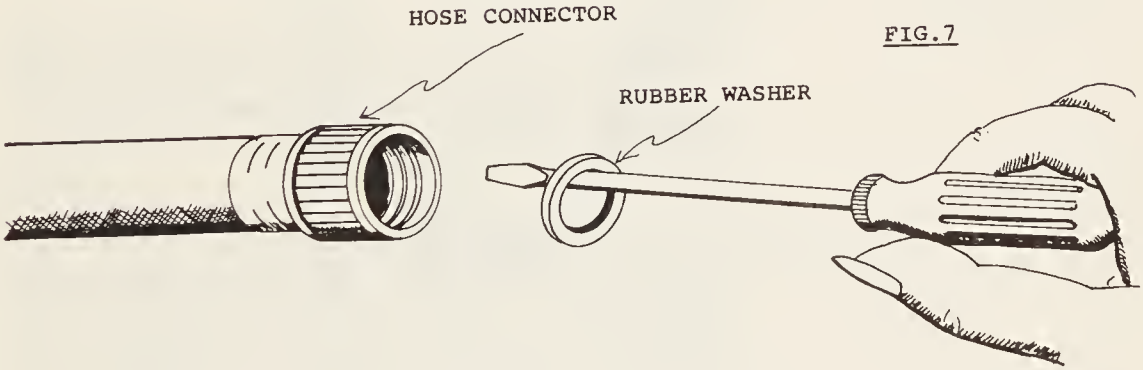


FIG.7

Problem Solver #2

APPLIANCE: Automatic Clothes Washers

PROBLEM: **Water supply hose leaks.**

EXPLANATION: Water leaks are more likely to occur at water supply hoses than anywhere else in automatic washers. Small leaks often appear at the hose end connections. In more severe cases, the hose may split or burst and cause flooding.

TOOLS AND MATERIALS NEEDED:

(a) a pair of universal pliers

(b) a small flatblade screwdriver

(c) one (or more as needed) standard water hose washer

(d) one (or more as needed) combination washer-filter screen

SOLUTION:

1. To locate the leak, place a finger alternately under the metal connectors located at both hose ends. The hose end responsible for the leak will wet the finger. *(Figure 1)*

   NOTE: The point on the hose from which water can be seen to drip does not necessarily indicate the exact location of the leak. In most instances, water leaking from a hose end connector will flow down along the outside of the hose and drip from the lowest bend.

FIG.1

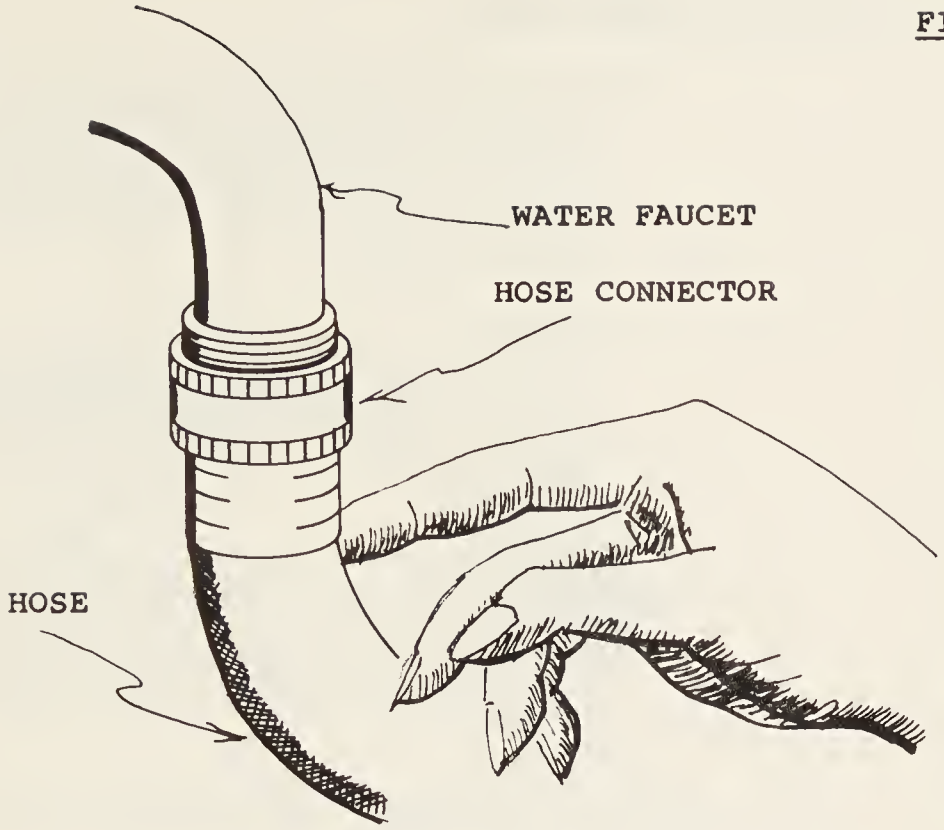
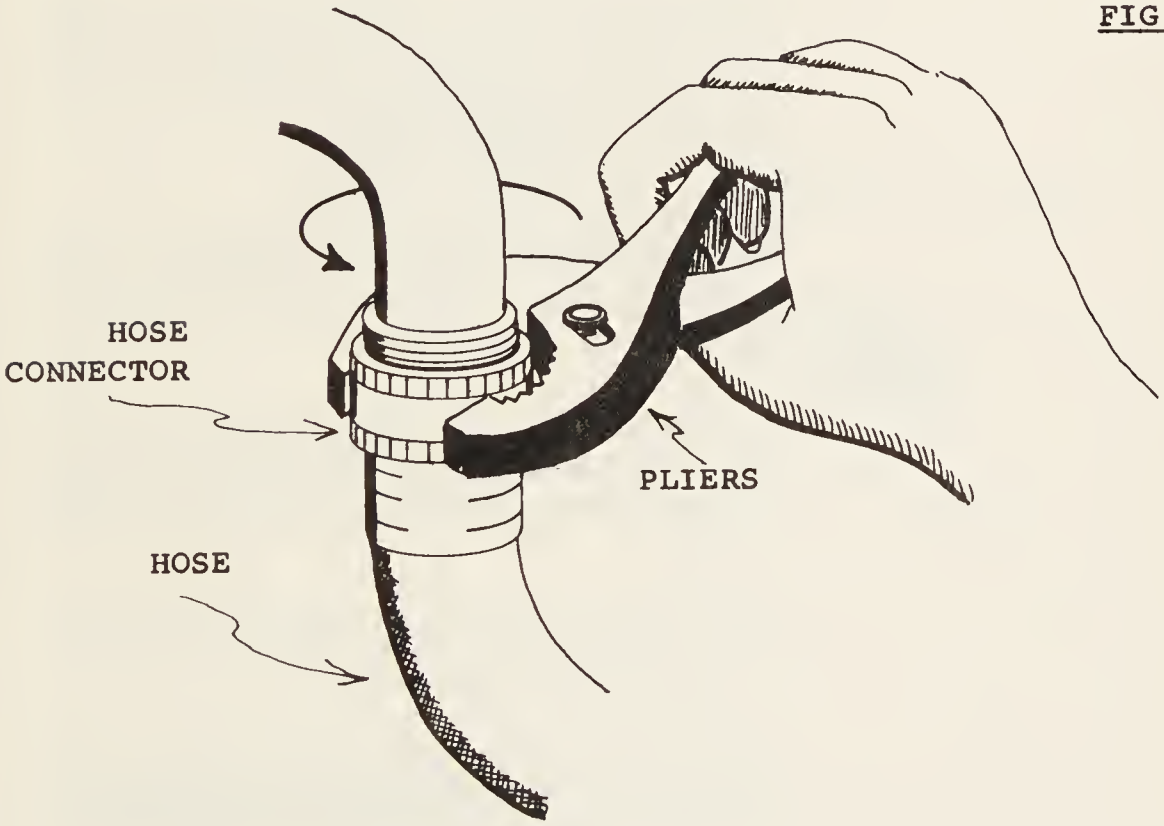

WATER FAUCET
HOSE CONNECTOR
HOSE

FIG.2


HOSE
CONNECTOR
PLIERS
HOSE

2. If water is detected at a hose connection, the connector should be removed and a new hose washer or combination washer-filter screen (whichever is required) installed. (See Problem Solver #1)

   CAUTION: Do not attempt to tighten a hose connection which has begun to leak. Overtightening may cause damage to either the water faucet or the water mixing valve inlet port (on the machine side).

3. To install a new hose washer, shut off water supply valve (at the faucet). Grasp the hose connector with a pair of pliers and turn it counter-clockwise until it becomes detached. *(Figure 2)*

4. Pry out the old rubber washer with the blade of a screwdriver. *(Figure 3)*

   NOTE: The old rubber washer may have become brittle and may break during removal. If so, make sure all pieces which may have stuck to the hose connector are carefully scraped away with the blade of a screwdriver. *(Figure 4)*

5. Place a new washer in the hose connector. Make certain that it is fully inserted by pressing down along its edges with the blade of a screwdriver. *(Figure 5)*

6. Screw the hose connector clockwise onto the faucet or water mixing valve inlet port (as the case may be) and tighten it as much as possible by hand.

7. Grasp the hose connector with a pair of pliers and tighten it a little more.

   CAUTION: Do not tighten hose connection with pliers until you are certain that it is fully tightened by hand. Do *not* overtighten hose connection.

FIG.3

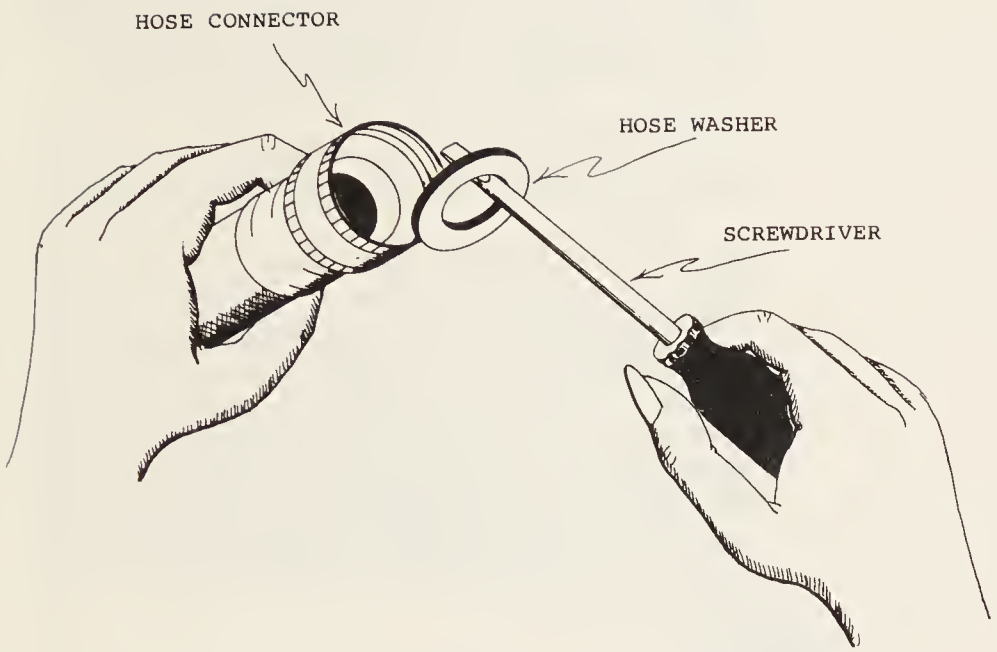
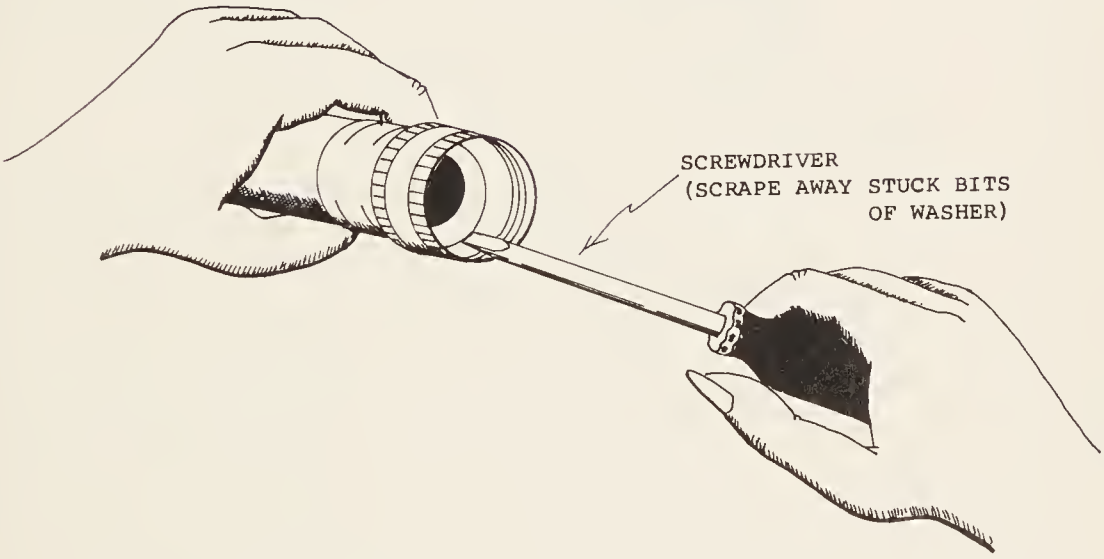

HOSE CONNECTOR
HOSE WASHER
SCREWDRIVER

FIG.4

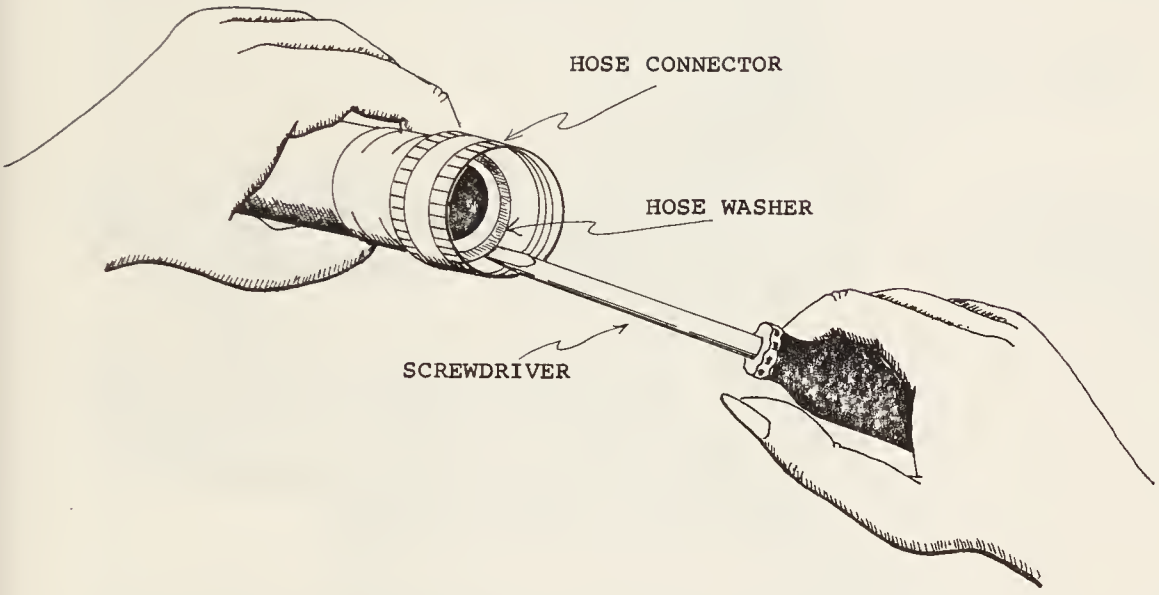

SCREWDRIVER
(SCRAPE AWAY STUCK BITS
OF WASHER)

8. Water leaks caused by a hose that has burst are obvious and easily located. The remedy for this condition is simply to replace the entire hose. Steps 3, 5, 6, and 7 should be followed when installing a new water supply hose.

NOTE: When purchasing water supply hose, specify whether hot water or cold water hose is required.

SPECIAL NOTE: Flexible (rubber) water supply hoses are designed for temporary use, for those periods of time when the clothes washer is in actual operation. They should not be subjected to constant water supply pressure between machine uses. Therefore, the water supply faucet valves should be closed whenever the clothes washer is not in operation. This will prolong the life of the water hoses and prevent serious flooding should either hose leak or burst without notice.

FIG.5



Problem Solver #3

APPLIANCE: Automatic Clothes Washers

PROBLEM: **Water does not enter tub during "FILL" period, but machine agitates in "WASH."**

EXPLANATION: This condition is often brought about by either an oversight or improper use of the clothes washer.

TOOLS AND MATERIALS NEEDED:

None

SOLUTION:

1. Check to make sure that the water supply valves are open at the faucet. *(Figure 1)*

2. Advance the timer control knob to "SPIN DRY." Allow the machine to complete this period of operation so that any water left in the machine from previous use can be completely discharged. *(Figure 2)*

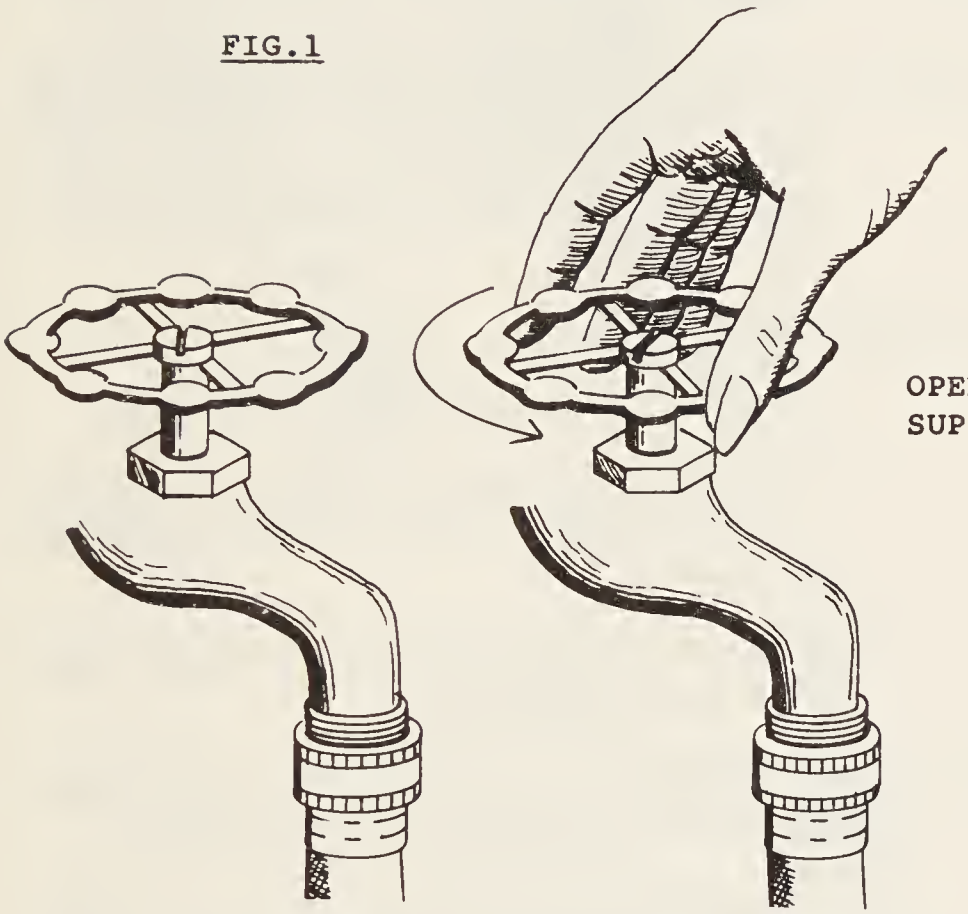
   SPECIAL NOTE: In the construction of modern automatic clothes washers, the quantity (fill level) of water required by the machine is automatically regulated by a device called the "fill level control." This device in the washer is capable of sensing the pressure created by the weight of the water in the washer tub. This pressure information is then acted upon by the water fill control as an electrical switch either to allow water to enter the washer when called for or to shut it off when it is not required.

   If the clothes washer is stopped manually during the final "SPIN DRY" period and before all of the water has been discharged from the machine (this may be attempted by the user when "permanent press" and "drip dry" clothing are removed to be hung while still wet), a sufficient quantity of water may be left in the tub to prevent the water fill control from allowing additional water to enter the

tub when a new wash load is started. It is important, therefore, to allow the washer to complete the entire cycle to avoid this problem.

3. After all water has been discharged from the machine, return the timer control knob to the "FILL" position to start the new cycle.

FIG.1



OPEN WATER SUPPLY VALVES

FIG.2

TIMER KNOB

Problem Solver #4

APPLIANCE: Automatic Clothes Washers

PROBLEM: **Water does not enter tub; machine does not agitate or spin.**

EXPLANATION: From all indications the clothes washer would appear to be completely "dead." This can be caused either by simply forgetting to turn on the water supply or by electric power failing to reach the clothes washer.

TOOLS AND MATERIALS NEEDED:

(a) a lamp (tabletop or other portable type)

(b) a 3-prong male plug (heavy duty metal clad type available at any electrical hardware store)

(c) an electrical fuse (type and size depends upon fuse to be replaced)

SOLUTION:

1. Check the water supply valves at the faucets to make sure they are open. *(Figure 1)*

2. Test the electric outlet to which the machine is connected to see if electric current is present. This is done by disconnecting the washer line cord plug from the electric outlet and plugging a lamp or other electrical device known to be good in its place. *(Figure 2)*

FIG.1

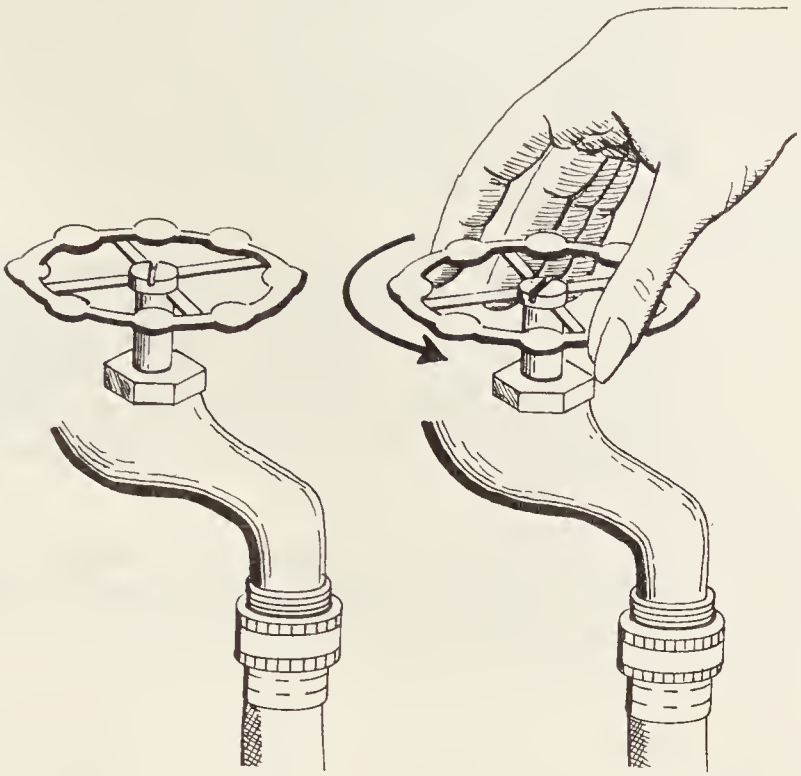
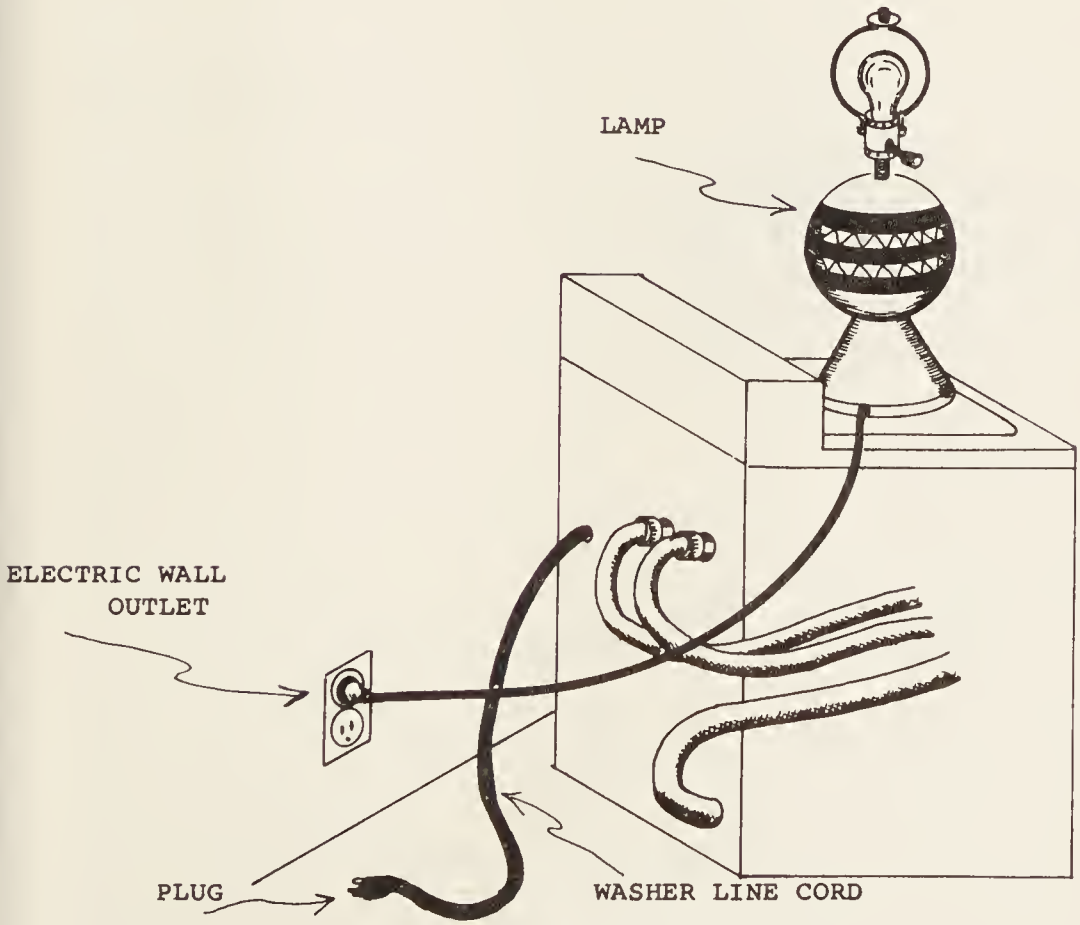


FIG.2

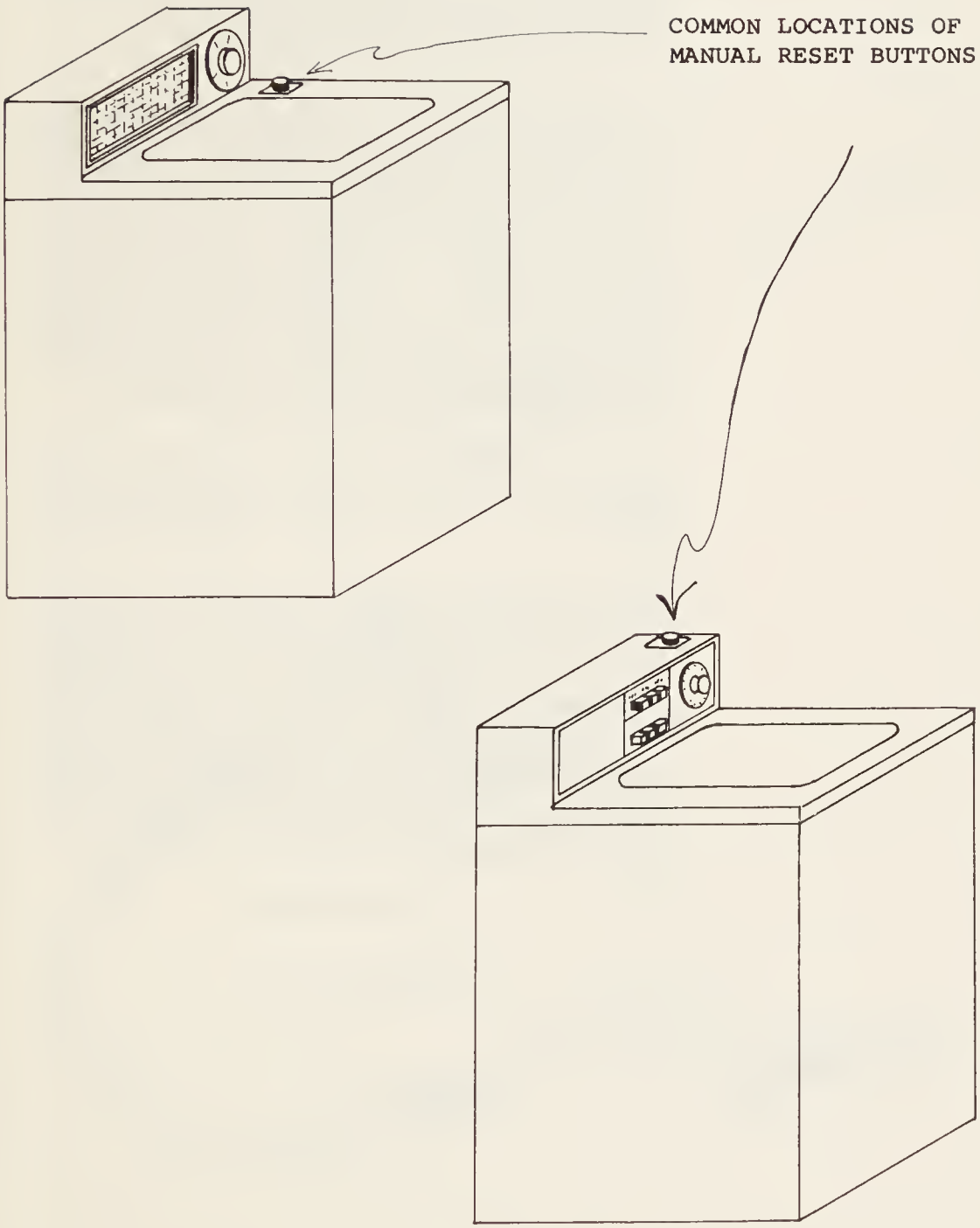


3. If the test lamp lights, the electric outlet is good and a check should be made on those washing machines that have "overload" or "unbalance" protection switches to see that the switch button is depressed to restore machine operation. *(Figure 3)*

   NOTE: Not all washing machines are equipped with "overload" or "unbalance" protection switches that can be reset manually by the user. Review the "User's Instruction Booklet" which has been supplied with the machine by the manufacturer to determine whether or not your washer has been so equipped.

4. If the washer does not contain a manual reset button, a careful check should be made of the washing machine line cord plug.

FIG.3



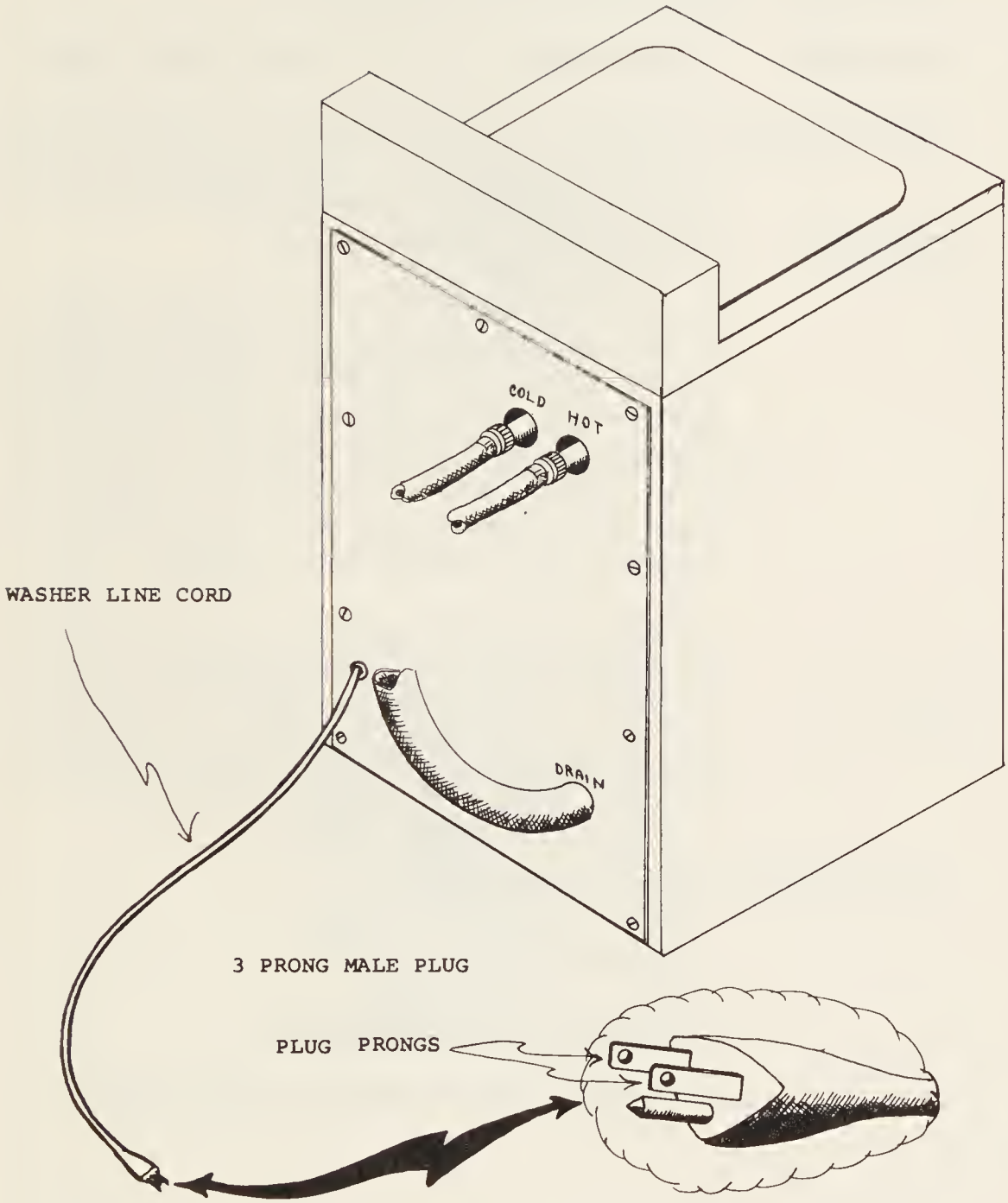
5. Examine the line cord plug for loose prongs and frayed, broken, or burned wires. *(Figure 4)* If the plug proves defective or even if its condition is dubious, replace the plug with a new one. For complete information see Section II, General Repair Procedures, How to Replace A Three-Prong Male Plug.

6. If the test lamp does not light when plugged into the washing machine wall outlet, the outlet is dead and a check of the house fuses or circuit breakers (whichever are used) will probably reveal that either a fuse has been blown or that a circuit breaker has been tripped, as the case may be. See Section II, General Repair Procedures, How To Locate and Replace Fuses, for this information.

   CAUTION: Do not connect the washing machine plug to the wall outlet until the fuse has been replaced.

7. After replacing the fuse, start and operate the washer in the routine manner for washing clothes. If the fuse blows (or circuit breaker trips) again, it indicates that a serious defect exists in the machine—one which will require further testing by a qualified appliance technician. Do not attempt to use the washer until it has been properly tested and repaired.

FIG.4


COLD
HOT
WASHER LINE CORD
DRAIN
3 PRONG MALE PLUG
PLUG PRONGS

Problem Solver #5

APPLIANCE: Automatic Clothes Washers

PROBLEM: **Water overfills or underfills during "FILL" period.**

EXPLANATION: Either of two types of systems are used in washing machines to regulate the level of water that enters the machine. the timer-controlled fill system and the pressure-controlled fill system.

In operation, the timer-controlled system allows water to enter the washer for a specific length of time (two, four, or six minutes); the length of time is selected by setting the timer-control knob. This system, still found in older washing machines, has been abandoned in virtually all new models because of its inability to provide constant fill levels under varying water pressure conditions.

For example: a fill setting of six minutes could supply a correct fill level during periods of the day when the water supply pressure in the home is low, but the same setting could cause overfill and flooding during those periods in the day when the water supply pressure may have increased.

TOOLS AND MATERIALS NEEDED:

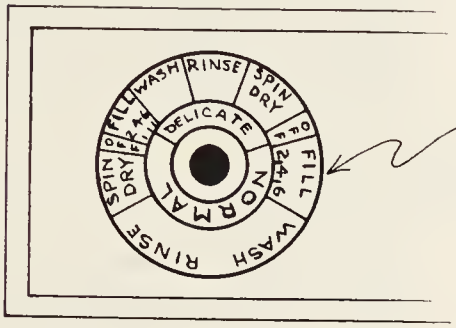
(a) a butter knife

(b) a screwdriver (medium size)

(c) a roll of tape (masking or white adhesive)

TIMER CONTROLLED FILL LEVEL SYSTEM

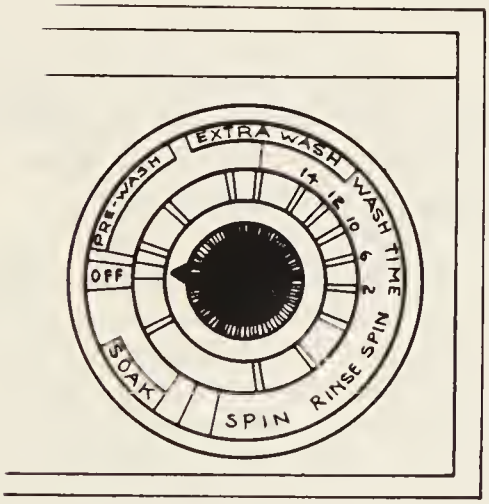
FIG.1



"FILL" PERIOD NUMERICALLY DIVIDED

PRESSURE CONTROLLED FILL LEVEL SYSTEM

FIG.2



(NOTE ABSENCE OF FILL PERIOD)

SOLUTION:

1. Determine whether the washer is equipped with timer-fill control or pressure-fill control.

   NOTE: The timer-control knob will usually help to identify which of the two systems is used. If the timer-control knob precedes each cycle with a "FILL" period containing numerical divisions such as: 2–4–6, the washer employs the timer-control system. *(Figure 1)* If the "FILL" period is not numerically divided or if the word "FILL" is not seen on the timer-control knob, then the pressure-fill system is being used. *(Figure 2)*

2. Overfill can be avoided with timer-controlled fill systems either by setting the timer to a lower "FILL" number or by reducing the water flow to the washer by partially closing the water supply valves at the faucets.

3. If a timer controlled washer underfills (not enough water), check to make sure that the water supply valves at the faucets are fully open.

4. If the water supply valves are fully open, check the filter screens in the water supply hoses to see if they are clogged. (See Problem Solver #1 for full details.)

   NOTE: If steps 3 and 4 fail to increase the water flow to the washer, the problem is probably caused by inadequate water supply pressure in the house plumbing. A qualified plumber should be called to test and correct the plumbing fault. Otherwise, the timer-control knob can be reset to provide additional "FILL" time after the initial "FILL" period as an interim measure so that the washer can continue to be used.

FIG. 3

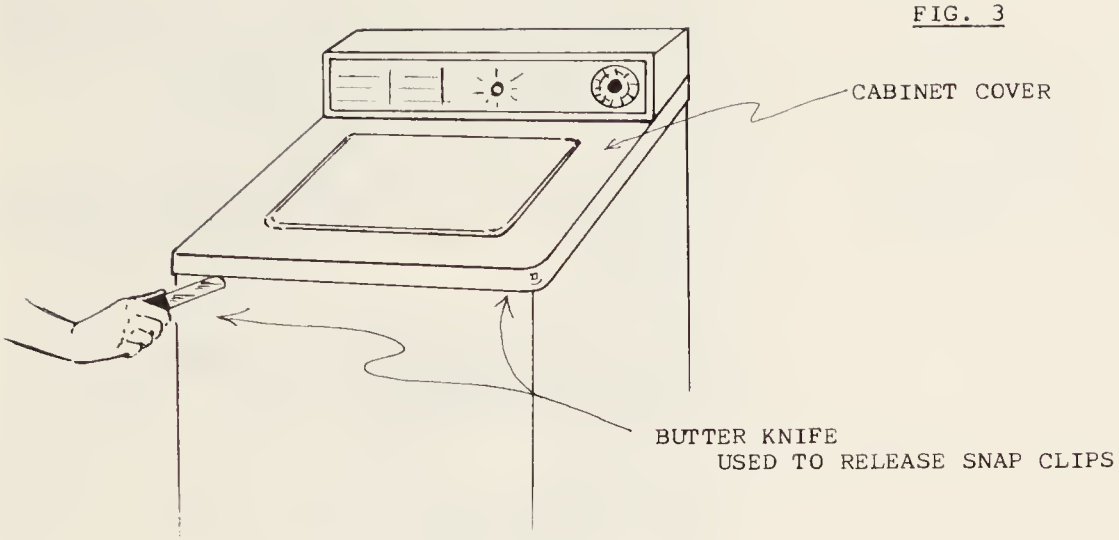
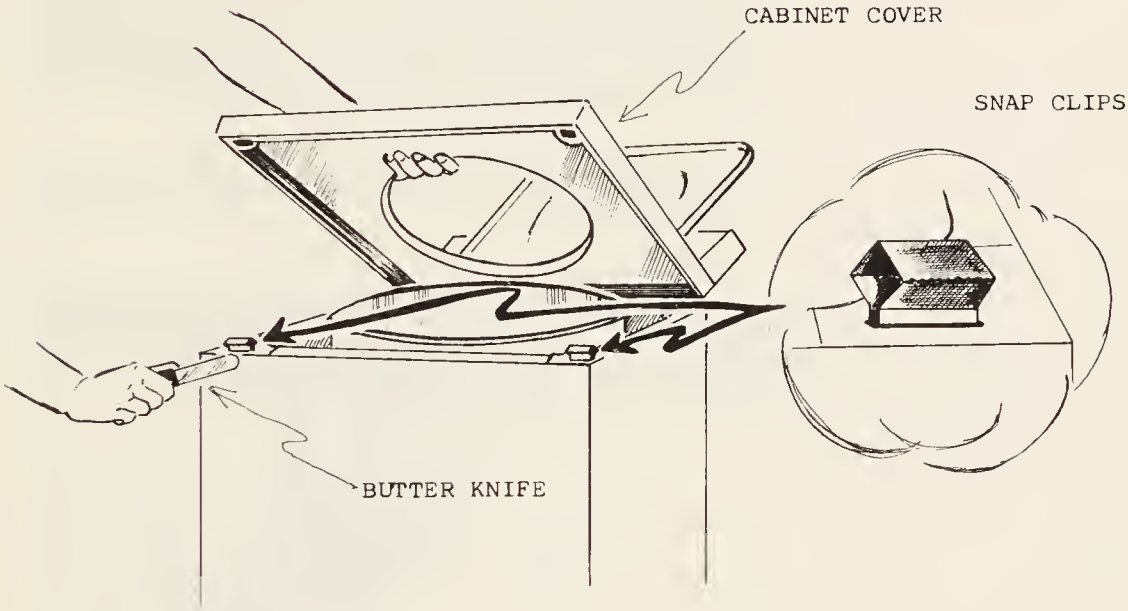

CABINET COVER
BUTTER KNIFE
USED TO RELEASE SNAP CLIPS

FIG. 4


CABINET COVER
SNAP CLIPS
BUTTER KNIFE

5. When washers that employ pressure type fill controls overfill or underfill, it usually indicates that the control has become defective and must, therefore, be replaced.

6. To replace the pressure fill control, access to it must first be gained by raising the cabinet cover.

7. Remove the line cord plug from the wall outlet before proceeding.

8. To raise the top cabinet cover, insert a butter knife under the front corners of the cover and push the knife against the snap clips to release the cover. *(Figure 3)*

9. Raise the loading lid, grasp the cabinet cover, and pull sharply upward. If cabinet cover does not lift easily, push against each snap clip with the butter knife while pulling upward on the cover with the other hand. *(Figure 4)*

10. Carefully rest the cabinet top against the rear wall. *(Figure 5)*

11. The pressure type fill level control should be located in one of the top corners of the cabinet (usually the rear corners). *(Figure 6)*

FIG. 5

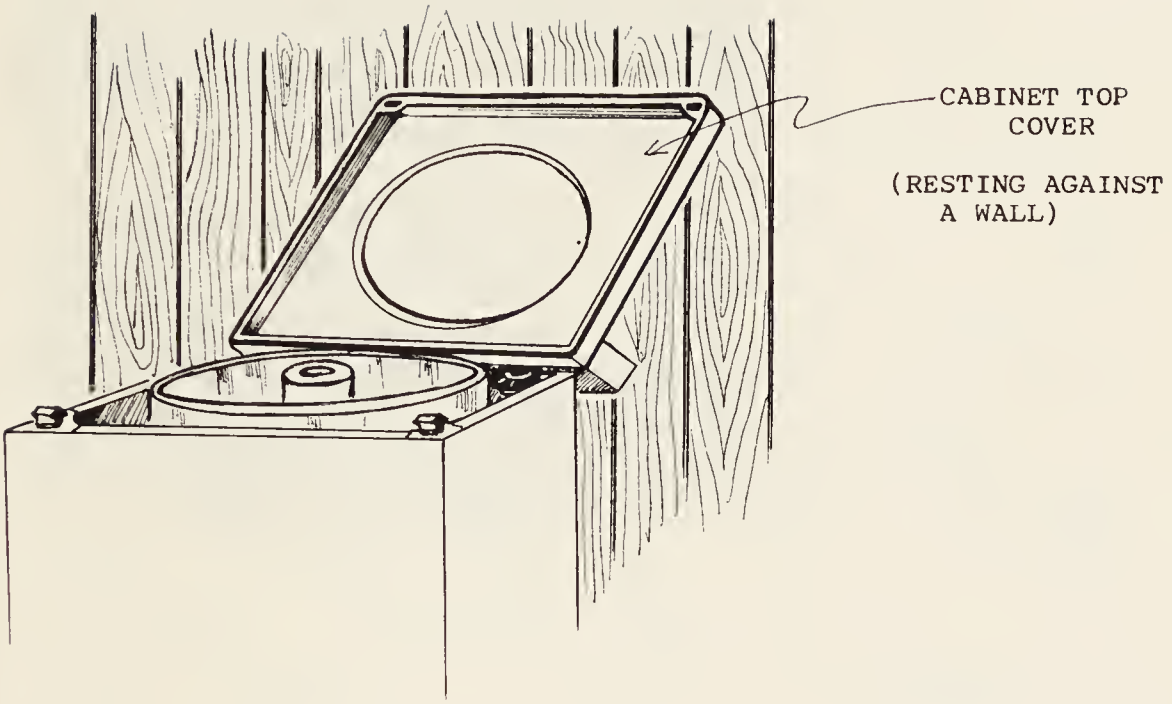
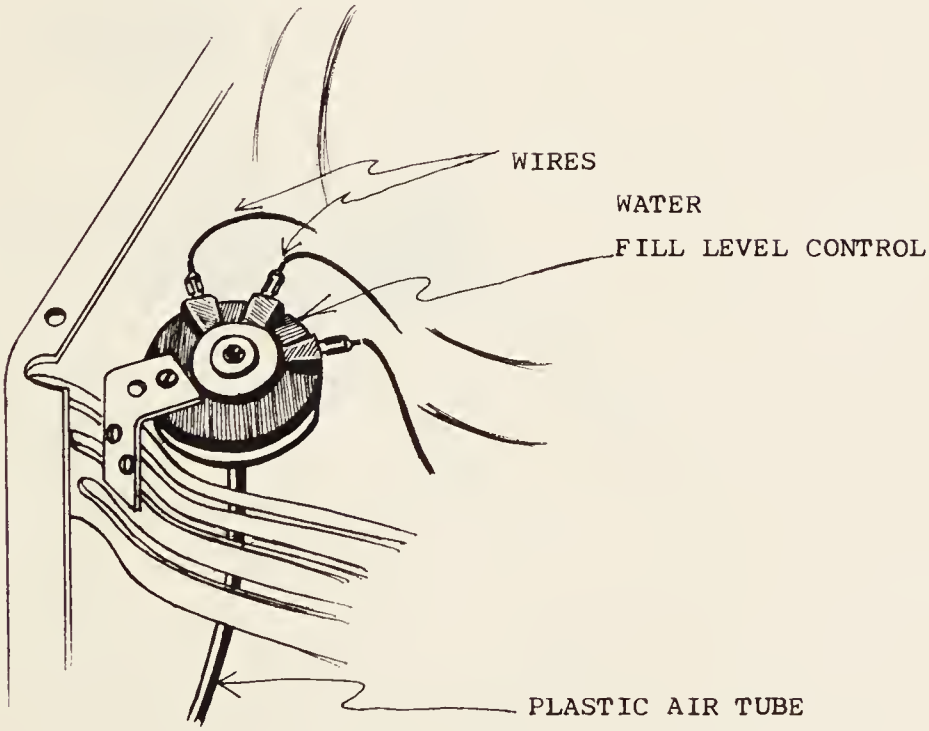

CABINET TOP
COVER
(RESTING AGAINST
A WALL)

FIG. 6


WIRES
WATER
FILL LEVEL CONTROL
PLASTIC AIR TUBE

NOTE: In a few washer models the fill level control is located in the console of the machine. To gain access to the fill level control for these machines, simply remove four to six screws that fasten an access panel onto the rear of the console and remove the panel. *(Figure 7)*

12. To remove the fill level control (from either cabinet or console), first tag each of the three wires going to the control. Place a strip of tape (masking or adhesive) with a number on each wire (1–2–3, consecutively from left to right). *(Figure 8)* This will prevent any confusion as to their proper location when they are reconnected to the replacement control.

FIG. 7

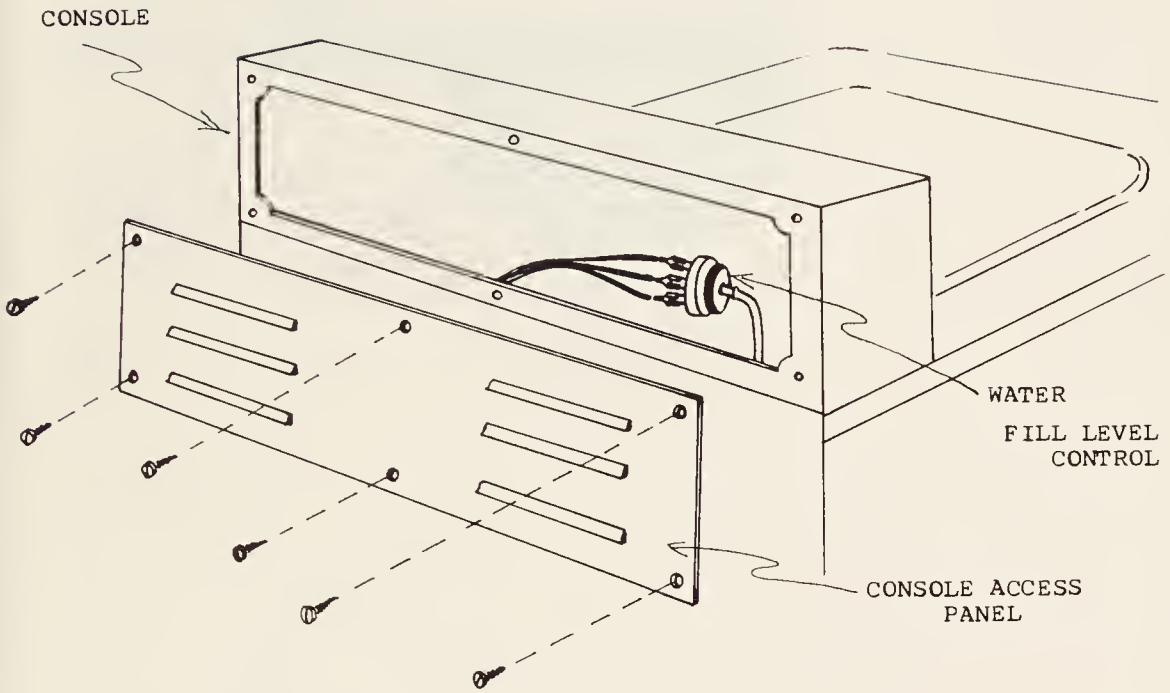
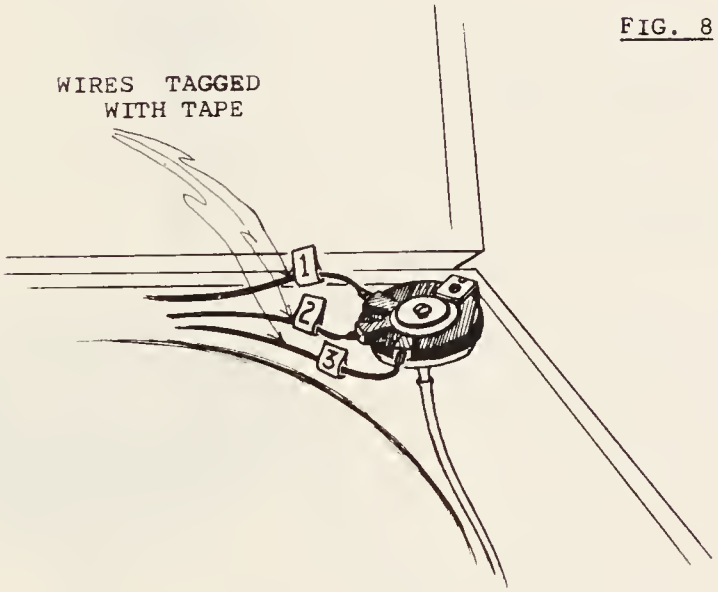

CONSOLE
WATER
FILL LEVEL
CONTROL
CONSOLE ACCESS
PANEL

FIG. 8


WIRES TAGGED
WITH TAPE
1
2
3

13. Remove the wires by simply pulling each one off. *(Figure 9)*

14. Remove the mounting screw by turning it counter-clockwise with a screwdriver. *(Figure 10)*

FIG. 9

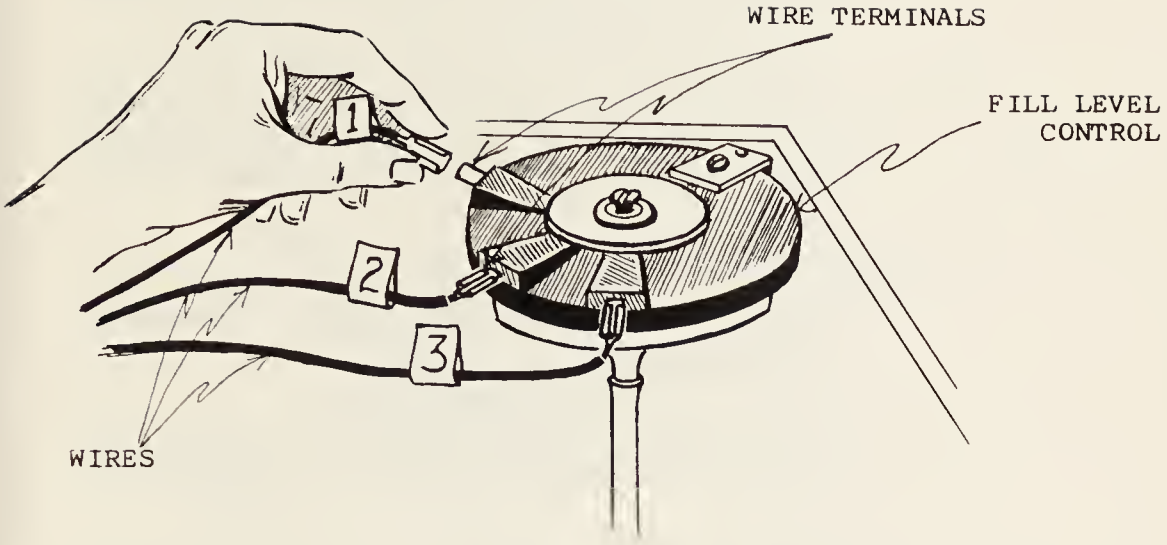
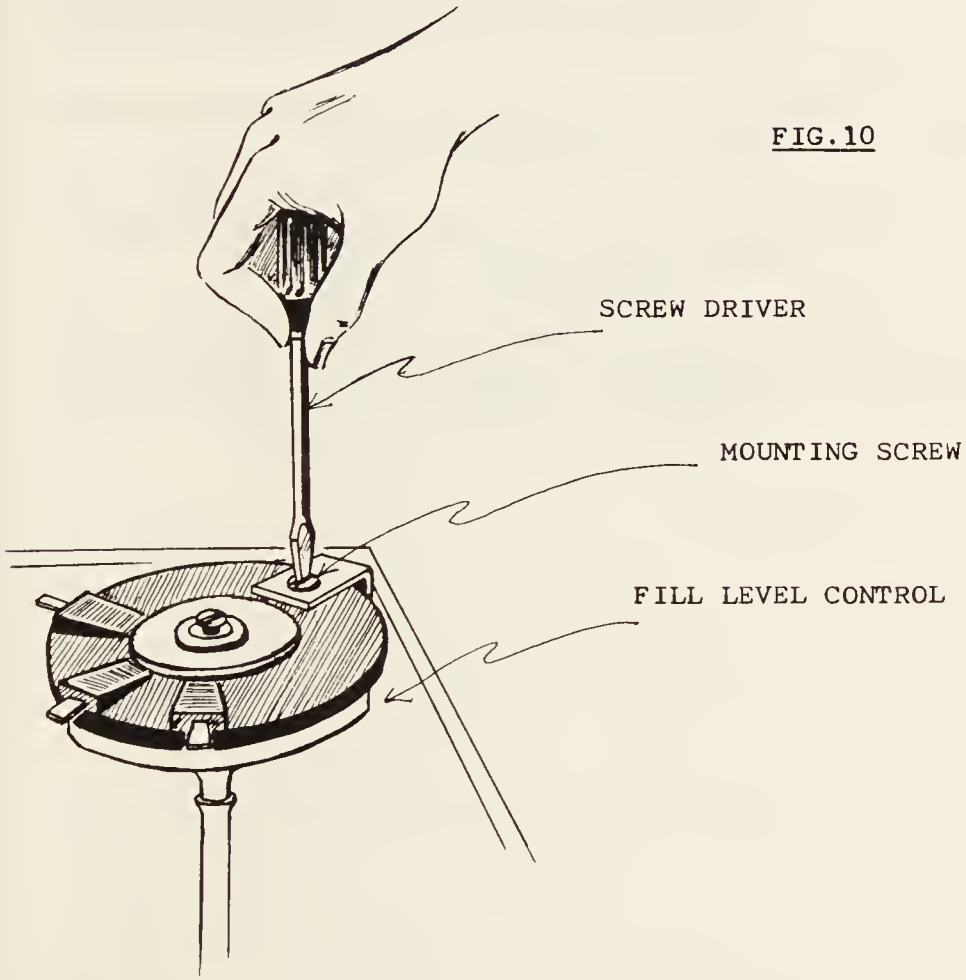

WIRE TERMINALS
FILL LEVEL CONTROL
1
2
3
WIRES

FIG.10


SCREW DRIVER
MOUNTING SCREW
FILL LEVEL CONTROL

15. Pry the plastic air tube off the control nipple with the aid of a screwdriver. *(Figure 11)*

    CAUTION: Do not allow the plastic air tube to drop beneath the cabinet. Tape or otherwise fasten the plastic air tube end so that it remains elevated. *(Figure 12)*

16. Install the new fill level control by first connecting the plastic air tube to the control nipple. *(Figure 11)*

17. Place the control in position and fasten it in place with the mounting screw. *(Figure 10)*

18. Connect the three wires (1–2–3) by pushing each onto the three wire terminals of the control beginning with #1 on the left. *(Figure 9)*

19. Replace the cabinet cover by pressing it firmly down onto the cabinet.

    NOTE: Replace the console access panel if the control was located in the console.

20. Connect the line cord to the electric outlet and test the machine by operating it in the normal manner of washing clothes.

FIG. 11

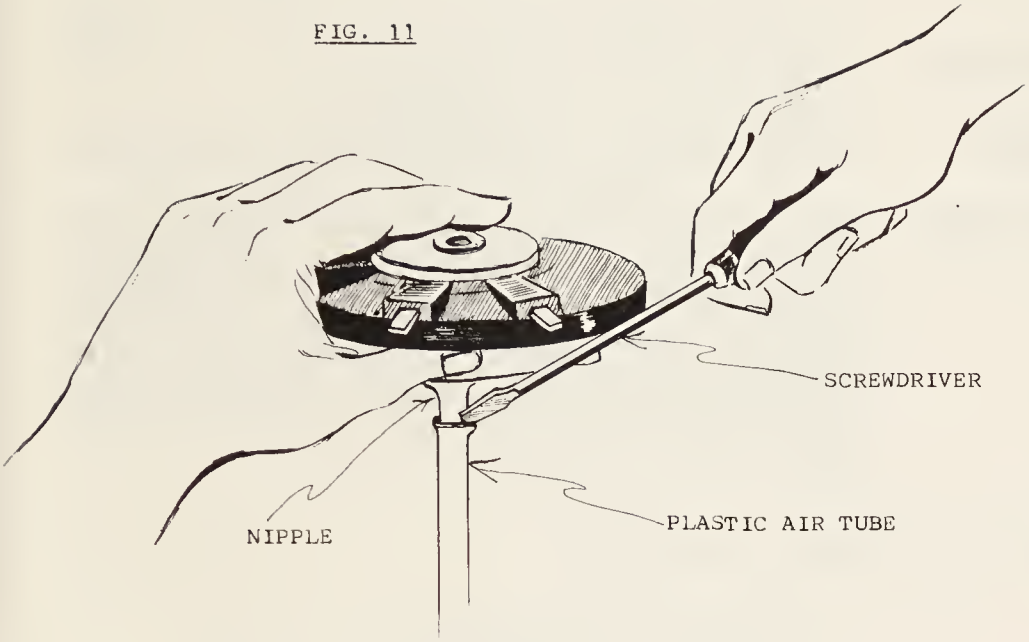
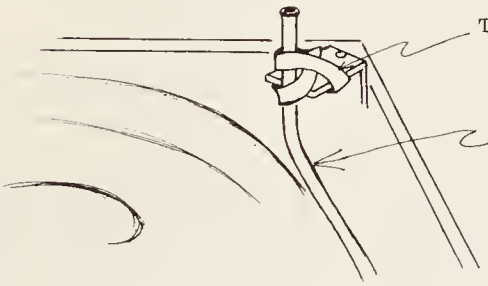


FIG. 12

FIG. 12



Problem Solver #6

APPLIANCE: Automatic Clothes Washers

PROBLEM: **Washer vibrates excessively during spin periods.**

EXPLANATION: When the washing machine is located in a separate laundry room, vibration is often tolerated and may even go unnoticed. In a kitchen location, this condition is a problem that can create a good deal of irritating noise. In either location, severe vibration can cause the washer to "walk" away from its location.

TOOLS AND MATERIALS NEEDED:

(a) a pair of universal pliers

(b) 4 rubber leveling leg pads (If required, they can be purchased from any major appliance service or parts supply stores.)

SOLUTION:

1. Check for an unbalanced wash load.

   NOTE: Unbalanced wash loads occur when fabrics settle unevenly in the spin basket before a spin rinse or spin dry period. The uneven weight will cause the spin basket to wobble when it rotates. Newer model washers, designed with good suspension systems, can absorb most of the vibration caused by unbalanced loads; but in older washer models poor suspension systems will allow the vibration caused by the wobbling spin basket to be transmitted to the entire machine. Special devices called "unbalance switches" were used in older washing machines to guard against severe vibration. These switches would automatically shut the washer off if wash loads were severely unbalanced.

2. If wash load is found to be unbalanced, redistribute fabrics evenly around the spin basket to correct the condition.

FIG.1

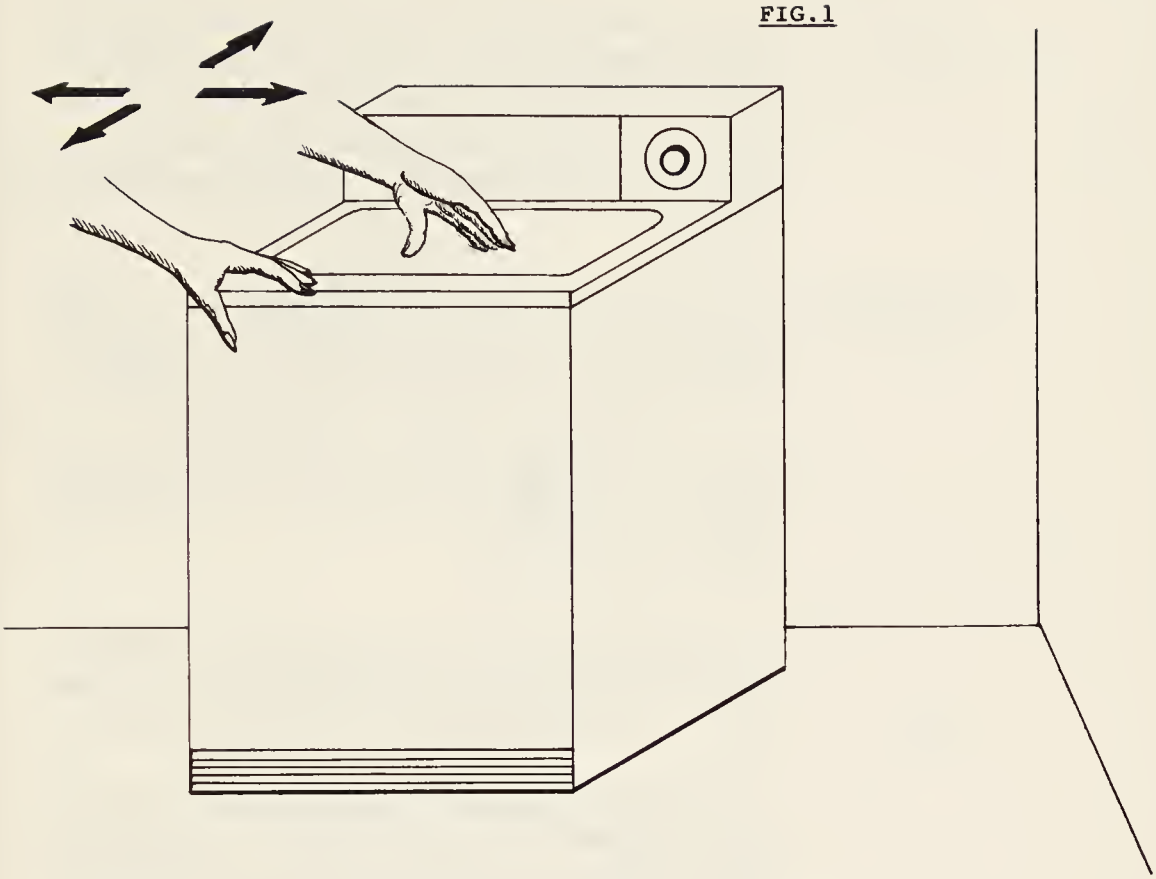
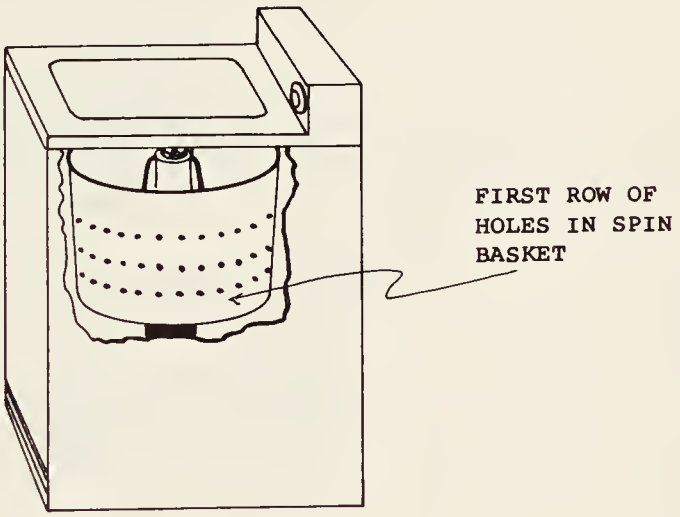


FIG.2



3. If the washer (regardless of age) consistently vibrates each time it is used, even when the wash load seems properly distributed in the spin basket, the machine should be checked to see that it rests firmly on the floor and that it is level.

4. The test to determine whether or not the washer rests firmly on the floor should be made when the washer is empty.

5. Grasp the washer by the cabinet cover and rock it diagonally from front to rear corners. *(Figure 1)*

6. If the washer can be moved (rocked) in either diagonal direction, an adjustment must be made to the leveling legs to steady the washer.

   NOTE: Leveling legs, located beneath each corner of the cabinet, are used not only to provide a steady footing for the washer but to provide a means of adjusting the tilt of the washer so that it stands level. In many washing machines the two rear leveling legs are self-leveling and only the front two legs can be adjusted.

7. Before adjusting the leveling legs, allow the washer to partially fill to the first line of holes in the bottom of the spin basket, then shut the washer off. *(Figure 2)*

8. Reach under the right front corner of the cabinet and grasp the leveling leg lock nut with a pair of pliers. *(Figure 3)* Turn the nut clockwise until it threads itself about one-half inch down the leveling leg. *(Figure 4)*

FIG.3

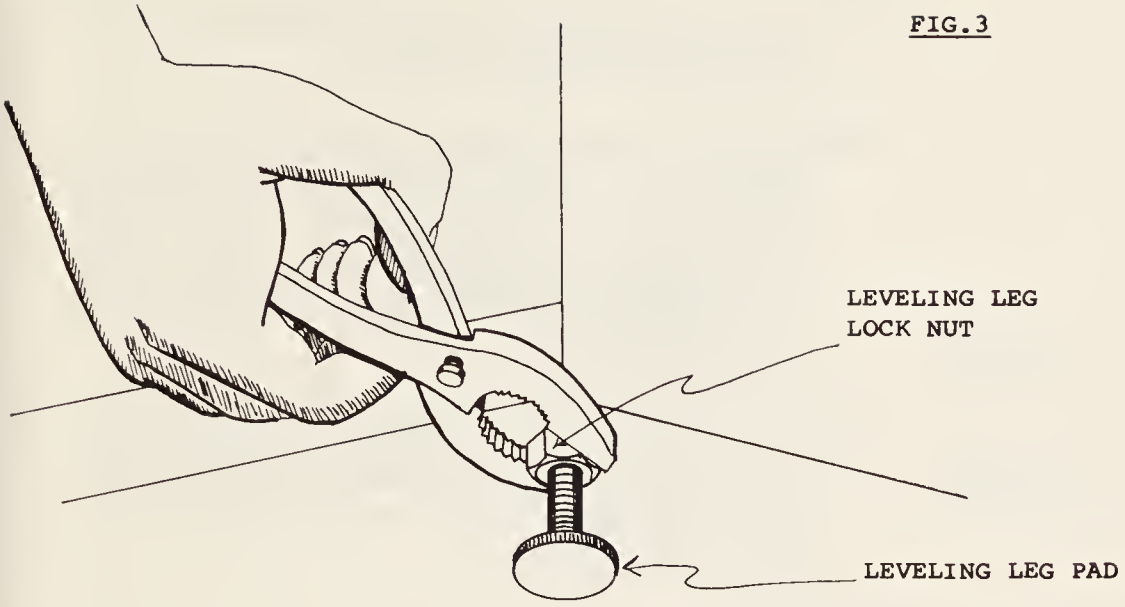
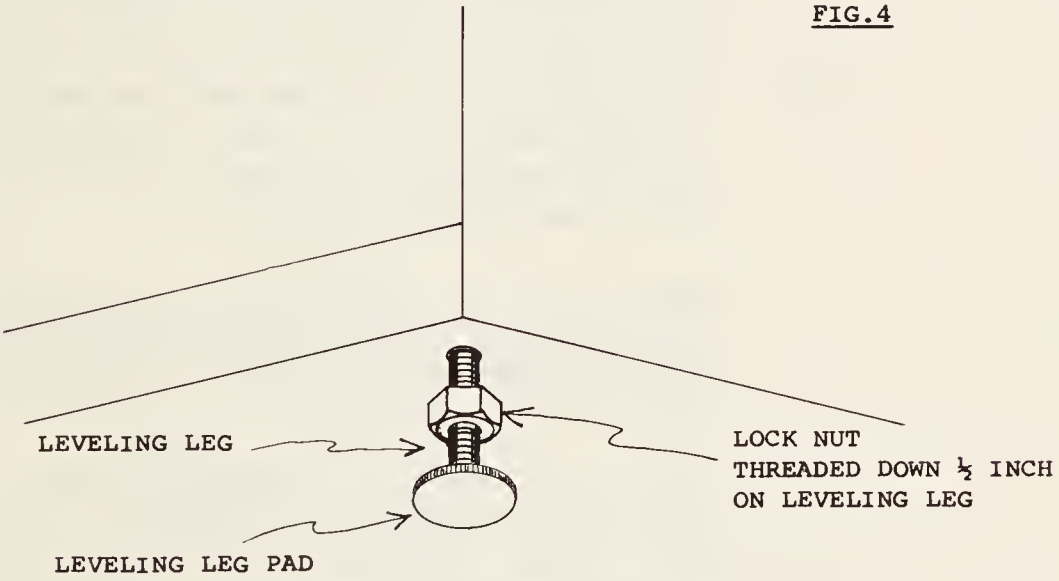

LEVELING LEG
LOCK NUT
LEVELING LEG PAD

FIG.4


LEVELING LEG
LOCK NUT
THREADED DOWN ½ INCH
ON LEVELING LEG
LEVELING LEG PAD

9. Do the same to the lock nut under the left front corner of the cabinet.

10. Observe the relationship of the water level to the first row of holes in the bottom of the spin basket. In a properly leveled washer, the height of the water line will be parallel to the row of holes around the entire circumference of the spin basket.

11. If the washer is not level, the water line will be seen above the row of holes around half the spin basket and below the holes around the other half. *(Figure 5)*

12. If the water level in the front of the tub is low, alternately shorten both front legs by threading each into the cabinet (two or three complete turns at a time) counter-clockwise until the height of the water level becomes parallel with the bottom row of holes. To turn the leveling legs grasp each at the bottom pad with a pair of pliers. *(Figure 6)*

    NOTE: The rubber leveling leg pads should be replaced with new ones if they are broken or worn. They are replaced by simply slipping them off the leveling legs.

13. If the water level in the front of the spin basket is high, turn each leveling leg out (two or three turns clockwise) until the water becomes parallel to the bottom row of holes.

14. After leveling washer, check to see that it continues to sit firmly on the floor (no rocking) as described in steps 4 and 5. Lengthen or shorten legs individually, if necessary, until machine is both level and stable.

FIG.5

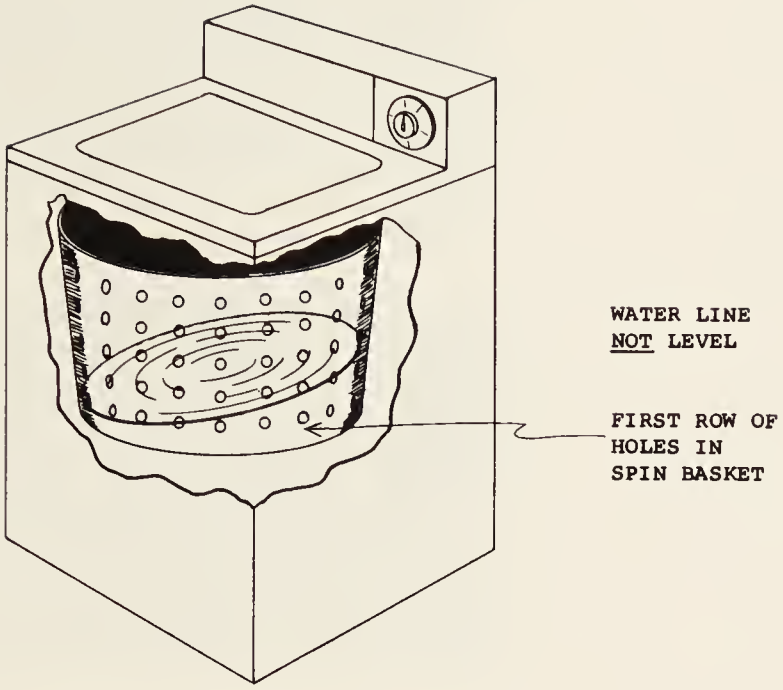
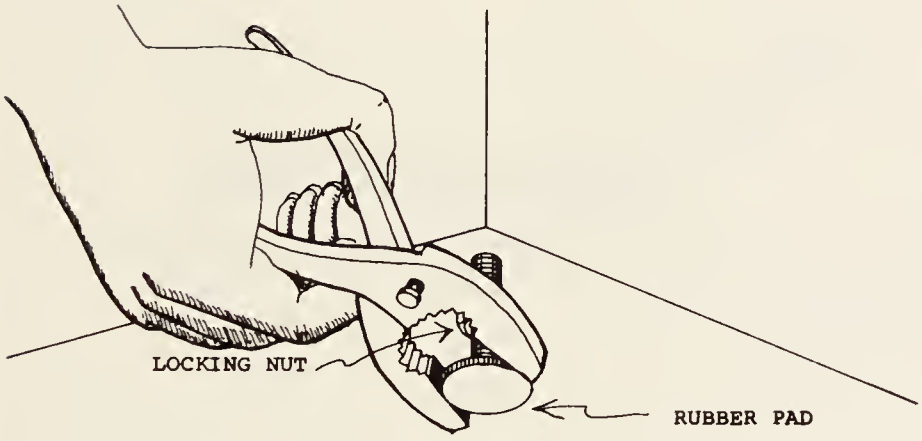

WATER LINE
NOT LEVEL
FIRST ROW OF
HOLES IN
SPIN BASKET

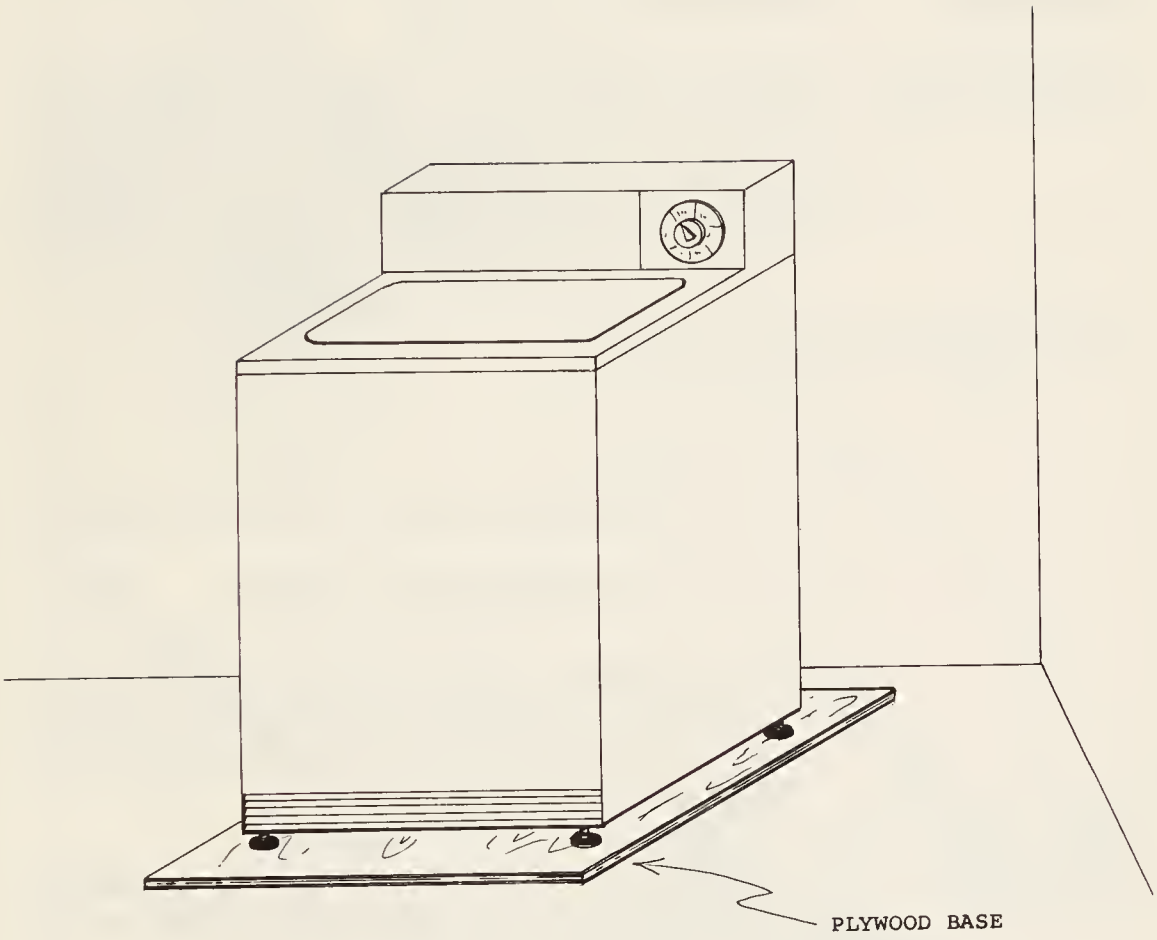
FIG.6


LOCKING NUT
RUBBER PAD

15. When the adjustment to the leveling legs is complete, tighten the leveling leg lock nuts to prevent the legs from further movement. Grasp each lock nut with a pair of pliers and turn it counter-clockwise until it becomes tight against the bottom of the cabinet. *(Figure 3)*

SPECIAL NOTE: The flooring under a washing machine must be capable of supporting the weight of a fully loaded machine to prevent vibration. If excessive vibration is encountered after all adjustments have been made, it is possible that the floor is springy or weak and should be reinforced by securing a three-quarter-inch thick piece of plywood to the floor beneath the washer. The width and depth of the plywood piece should be about three inches more than the base dimensions of the washing machine cabinet. *(Figure 7)*

FIG.7



Problem Solver #7

APPLIANCE: Automatic Clothes Washers

PROBLEM: **Clothes are torn by washer.**

EXPLANATION: Improper selection of "Gentle," "Delicate," or "Normal" cycles is not an important factor when this problem is encountered. Frequently, tearing of clothing is more likely to be caused by a defective agitator or spin basket.

TOOLS AND MATERIALS NEEDED:

(a) a hammer

(b) a stiff brush (floor brush or old hair brush)

(c) a jar of petroleum jelly (Vaseline)

(d) a replacement agitator (If needed, this can be purchased according to make and model of clothes washer from any major appliance service shop.)

SOLUTION:

1. Examine the agitator carefully for cracks or chipped areas that produce sharp edges that can snag and tear fabrics. *(Figure 1)*

   NOTE: Take particular note of the condition along the bottom edge of the agitator (near the spin basket).

2. A cracked, chipped, or otherwise defective agitator must be replaced.

3. To remove a defective agitator, first remove the agitator cap by turning it counter-clockwise. *(Figure 2)*

FIG.1

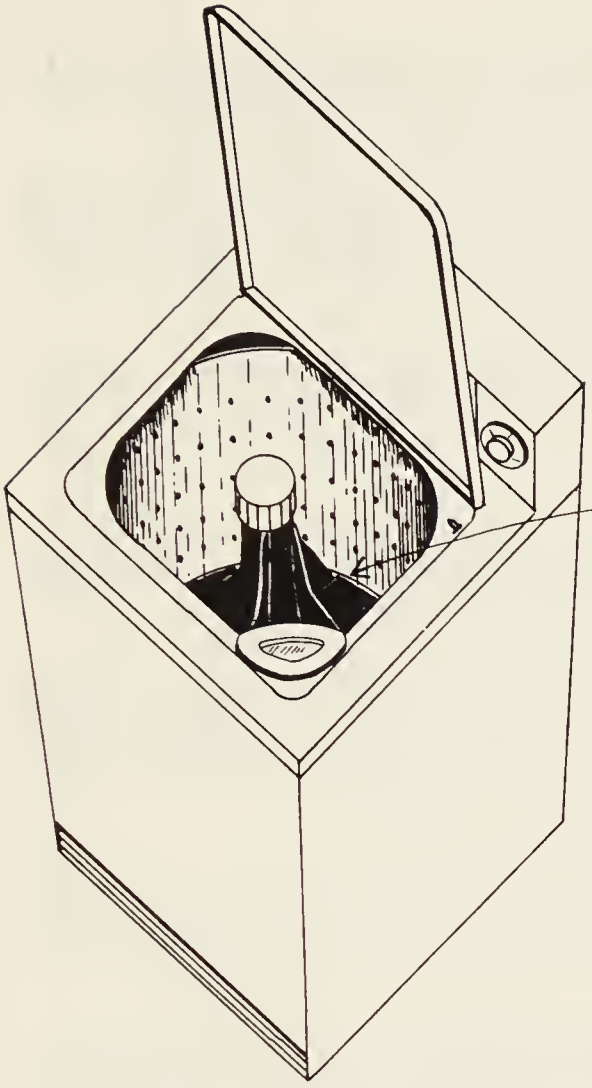
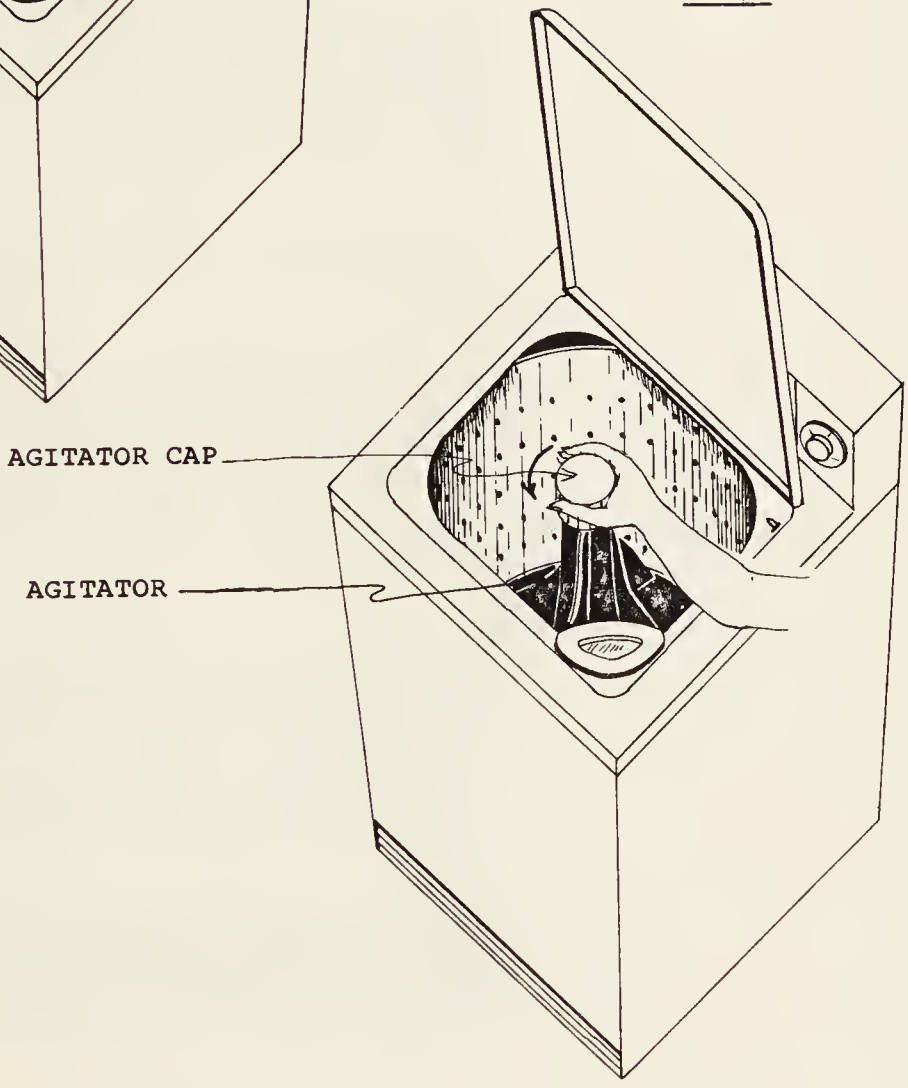


FIG.2



CAUTION: Remove the plug from the wall outlet before attempting repairs on the washer.

NOTE: Some model washers do not employ agitator caps to secure the agitator to the agitator shaft. The agitator in these washers is removed as described in step 4.

4. Grasp the agitator with both hands along its bottom and pull up sharply to remove it. *(Figure 3)*

NOTE: Agitators which have not been removed for long periods of time (years) may have become stuck to the agitator shaft.

5. To remove a stuck agitator, apply a lifting pressure with one hand from beneath the agitator and strike it sharply along its sides with a hammer. *(Figure 4)*

NOTE: In some cases it may be necessary to strike the agitator with enough force to break it in order to free it.

6. Clean the agitator drive block with hot water applied with a stiff brush to remove hardened detergent and mineral residues. Then, coat the drive block with a thin film of household petroleum jelly before replacing the new agitator. *(Figure 5)*

7. If examination of the agitator discloses that there are no defects (cracks, chips, etc.), check for vertical movement of the agitator. Without removing the agitator cap, grasp the agitator at the bottom and attempt to move it up.

NOTE: There must be no vertical movement of the agitator. The space between the bottom of the agitator and spin basket is normally only enough to allow the finger tips to be inserted. Any vertical

FIG.3

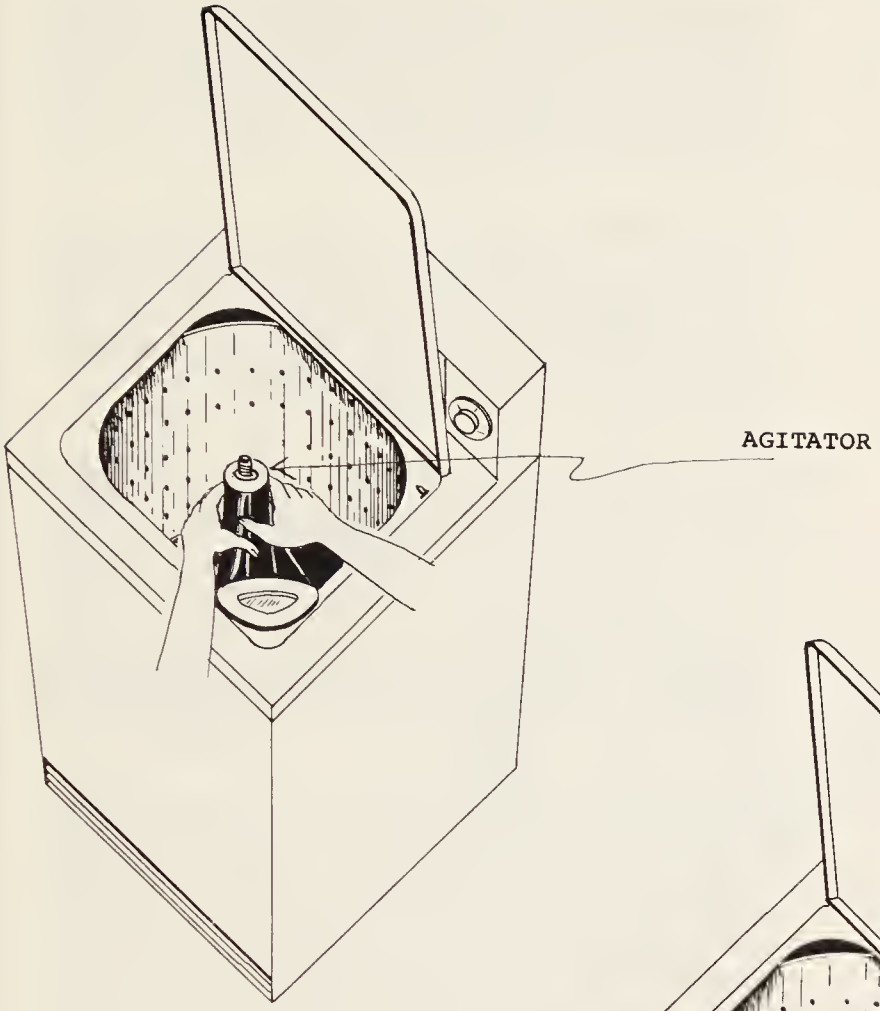
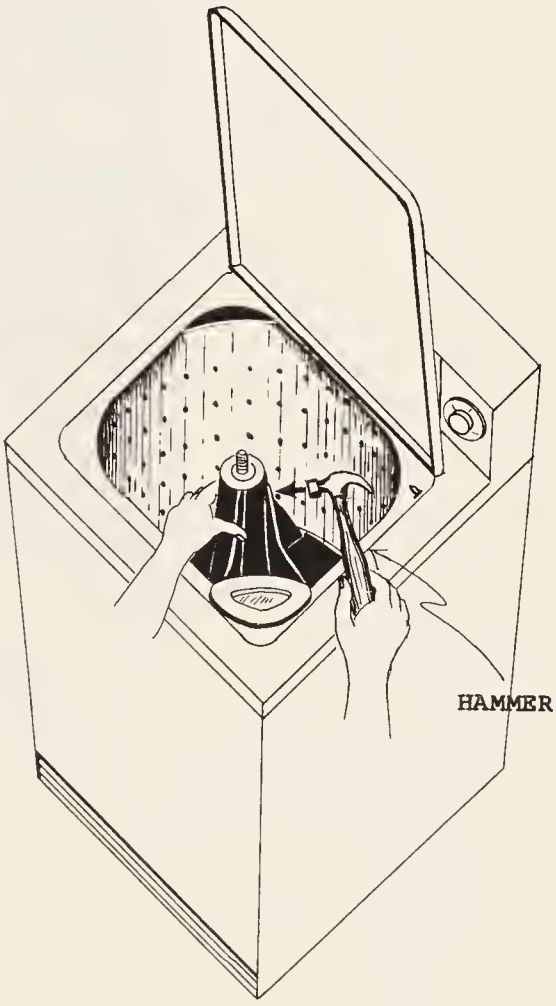


FIG.4



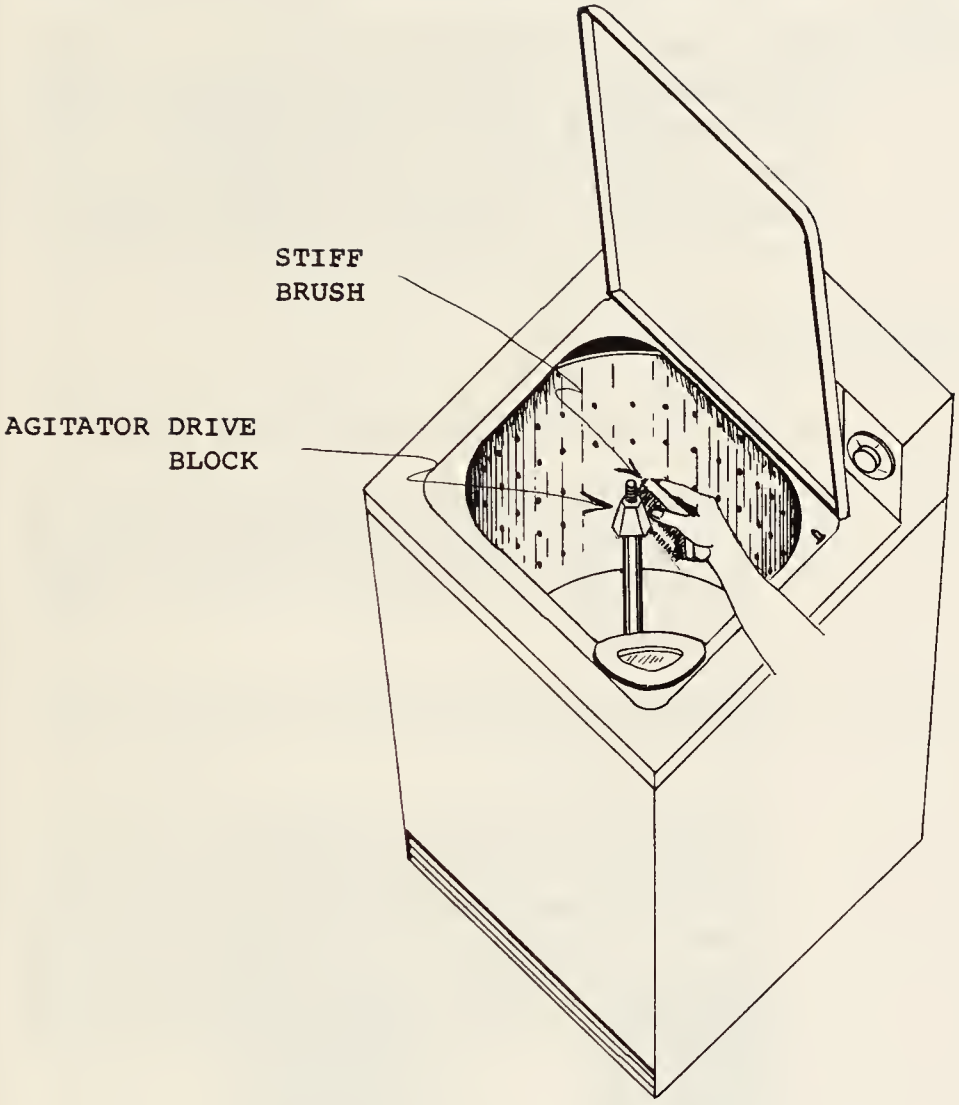
movement or space greater than one-quarter inch between the bottom of the agitator and the spin basket is excessive. This will allow fabrics being washed to be caught between the agitator and spin basket where they can tear.

8. To eliminate excessive space, tighten the agitator cap (which may have loosened) fully onto the agitator. For washers which have no agitator caps, press the agitator down hard to seat it fully onto the agitator shaft.

9. Finally, check the porcelain finish of the spin basket, especially the bottom of the basket which surrounds the agitator. The porcelain coating on the spin basket should be free of chips and should feel as smooth as glass. If the porcelain finish feels rough (like sandpaper) or is chipped, the spin basket should be replaced.

NOTE: The abrasive texture of a worn spin basket finish can be damaging to fabrics. Strangely enough, the rough surface can often force fabrics under the agitator where they can tear. Spin baskets with worn porcelain finishes are found in washing machines that have been in service for many, many years. Since replacement of the spin basket is a costly, major repair that requires the services of a qualified appliance technician, an evaluation of the general condition of the washer should be taken into account to determine whether to have the machine repaired or replaced.

FIG.5



Problem Solver #8

APPLIANCE: Automatic Clothes Washers

PROBLEM: **Control knob does not advance timer manually.**

EXPLANATION: The timer-control knob provides a means of selecting a particular washing cycle. When this problem is encountered, the control knob turns freely when rotated manually, but does not move the internal timer mechanism. In the majority of cases, this is caused by a loose or broken knob.

TOOLS AND MATERIALS NEEDED:

(a) a small screwdriver (see glossary of tools)

(b) a set of allen wrenches (An inexpensive set can be purchased for under $2.00 from most hardware stores.) (see glossary of common appliance terms)

SOLUTION:

1. Examine the knob shaft to see if a set screw is used. *(Figure 1)*

   NOTE: Control knobs are frequently fastened to the shaft of timers with set screws. Two types of set screws are used. One can be recognized by its more traditional slot-head appearance and the other by its recessed, hexagonal appearance. The latter type is called an "allen head" set screw. *(Figure 2)*

FIG.1

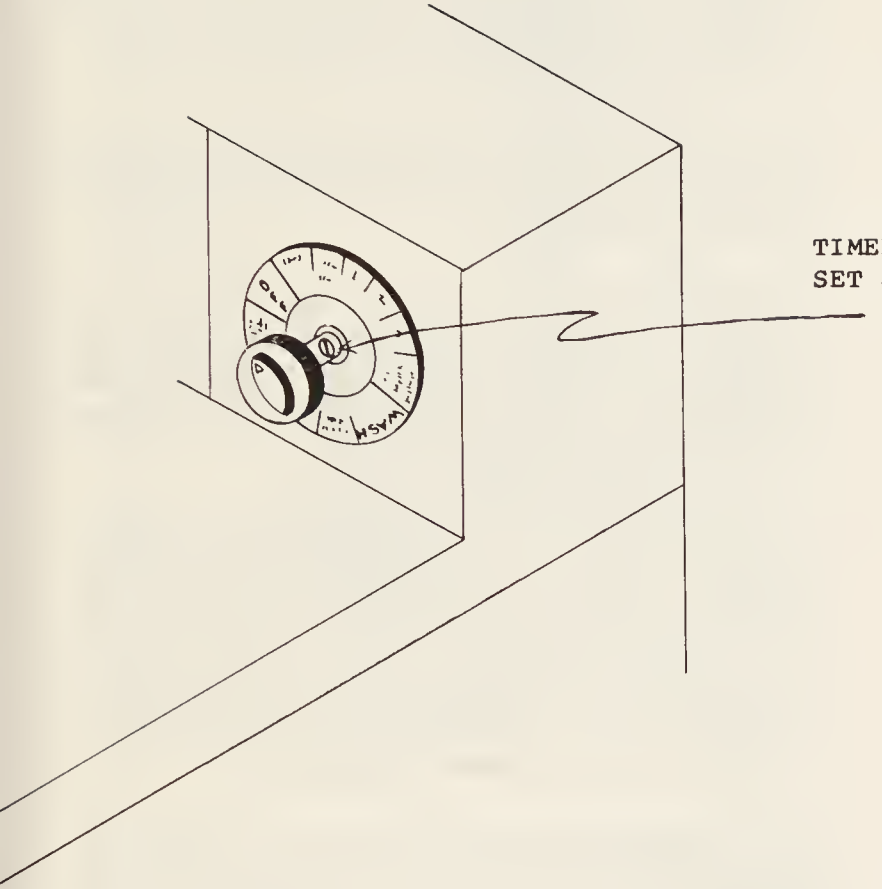
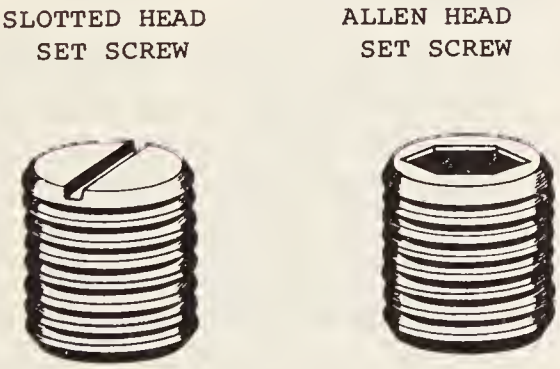

TIMER CONTROL KNOB
SET SCREW

FIG.2


SLOTTED HEAD
SET SCREW
ALLEN HEAD
SET SCREW

2. If the timer-control knob uses a set screw, tighten the set screw clockwise by using either a small screwdriver or an allen wrench (whichever is required). *(Figures 3 and 4)*

3. After tightening the control knob, advance the timer manually, and check to see that it is indicating correctly.

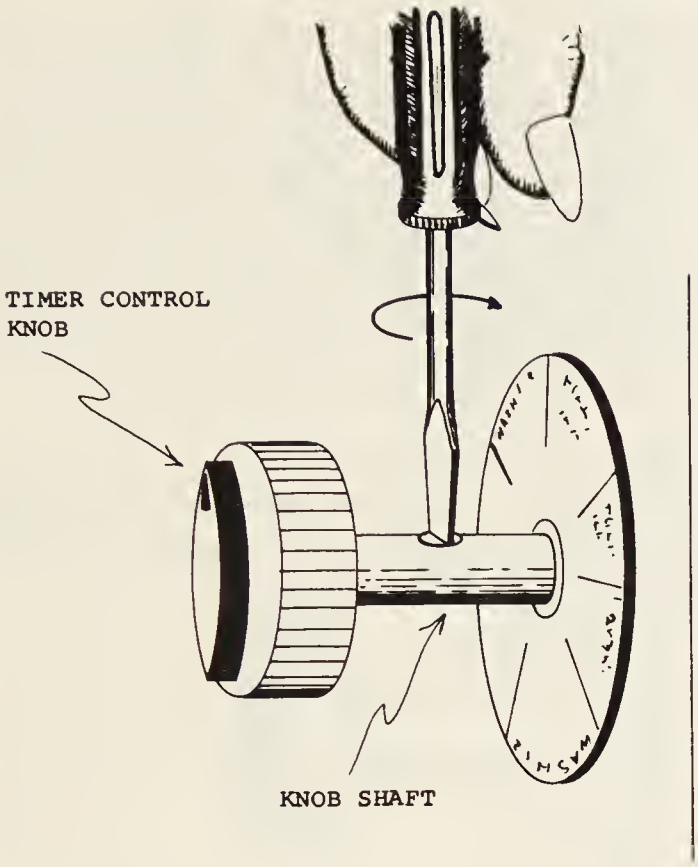
   NOTE: Once the control knob has become loose from the timer shaft, it will no longer point to the actual cycle that the timer is in. Therefore, the control knob must be realigned with the timer before it is finally secured.

4. To realign the control knob, turn the washer "on" and advance the knob until the washer shuts off. Loosen the set screw (counter-clockwise), just enough (two or three turns) to free the knob from the shaft. Turn the knob until it indicates "off." Hold it in this position and retighten the set screw. *(Figure 5)*

   NOTE: Washing machines that have more than one cycle will, of course, have more than one "off" position on the cycle dial. An additional check must be made with these multi-cycle washers to insure proper alignment of the control knob. *(Figure 6)*

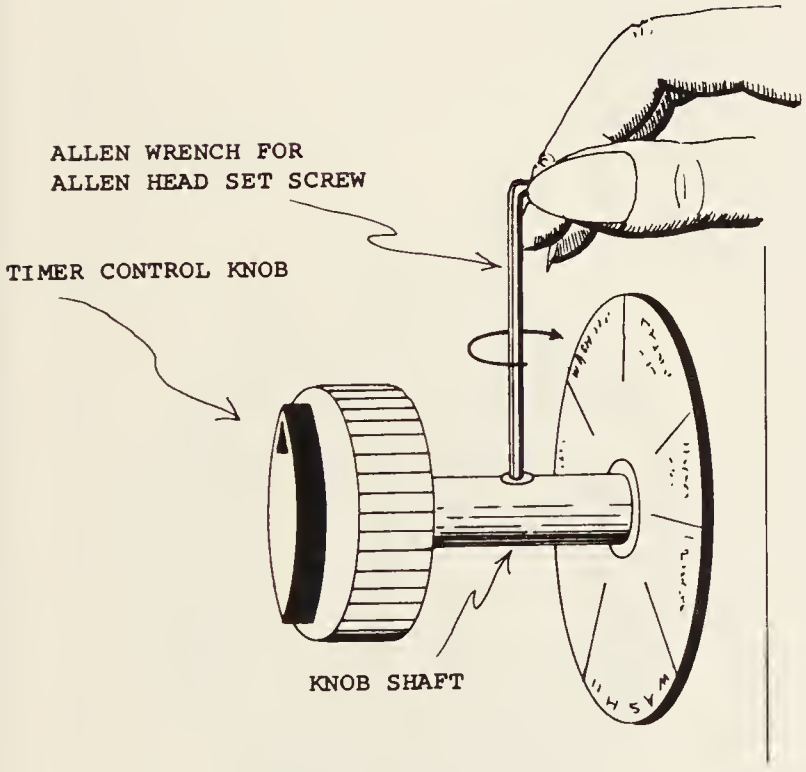
5. To check for control knob alignment on multiple-cycle washers, advance the knob to each "off" position on the cycle dial. If the washer does not shut off on all "off" positions, advance the timer to the "off" position, which has already been identified. (step 4) Loosen the knob set screw and turn the knob only to the next "off" setting. Retest the washer to see that it shuts off on every "off" setting of the knob. This procedure is to be continued, if necessary, until the control knob is in correct alignment with the timer.

FIG.3



SCREWDRIVER FOR
SLOTTED HEAD
SET SCREW

FIG.4



SPECIAL NOTE: Various other means are also used to attach the control knob to the timer shaft of washing machines. In some washer models a control knob set screw is used, but the actual turning of the timer is accomplished by a ratchet drive assembly that connects the control knob to the timer shaft. *(Figure 7)* With this design, the control knob may fail to advance the timer when the gears become worn even though the set screw is tight. When a problem is encountered with this type of control knob, the knob must be replaced.

6. To replace the type of control knob illustrated in *Figure 7,* loosen the set screw with a small screwdriver and pull the entire assembly (knob and ratchet section) off.

FIG.5

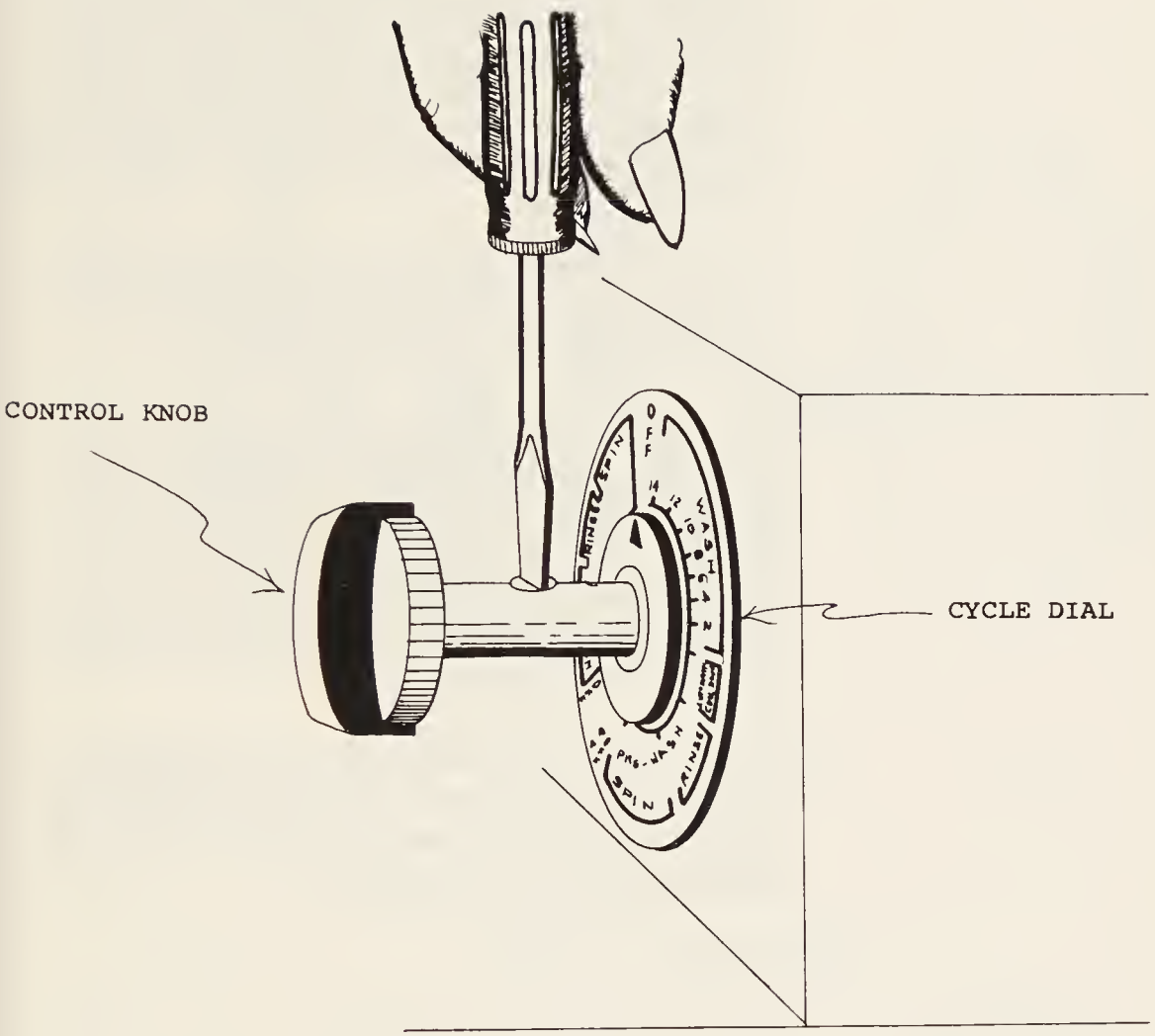
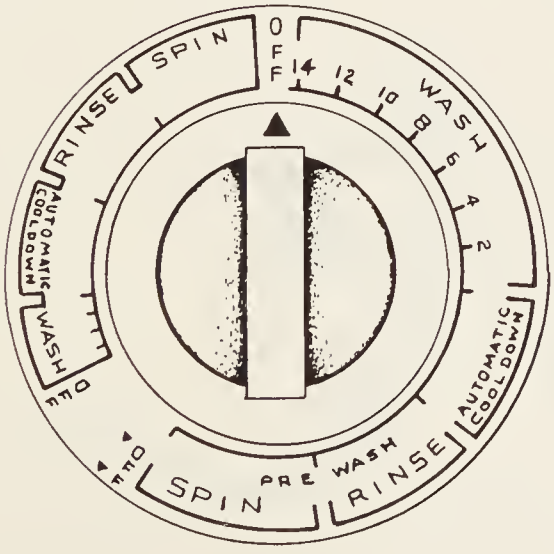

CONTROL KNOB
CYCLE DIAL

FIG.6


OFF
14
12
10
8
6
4
2
WASH
AUTOMATIC COOL DOWN
PRE WASH
RINSE
SPIN
OFF
AUTOMATIC COOL DOWN
WASH
RINSE
SPIN

SPECIAL NOTE: Finally, a timer-control knob design that is being used increasingly in new-model washers is fastened to the threaded shaft of the timer by simply screwing it on. *(Figure 8)* Should this type of control knob fail to advance the timer, it could mean that the knob has cracked and no longer grips the timer shaft. The knob must be removed and checked to determine whether to repair or replace it.

7. To remove the control knob illustrated in *Figure 8,* turn it counter-clockwise until it threads itself off the timer shaft.

8. Examine the shaft of the control knob. If it is cracked, it can be mended as described in Section II, General Repair Procedures, How to Repair Control Knobs. After the knob has been mended, it can be replaced by screwing it (clockwise) back onto the threaded shaft of the timer. *(Figure 8)*

9. If the knob shaft does not show evidence of being cracked or broken, then the threads inside the knob shaft are most likely worn and the knob must be replaced.

FIG.7

RATCHET DRIVE TYPE CONTROL KNOB

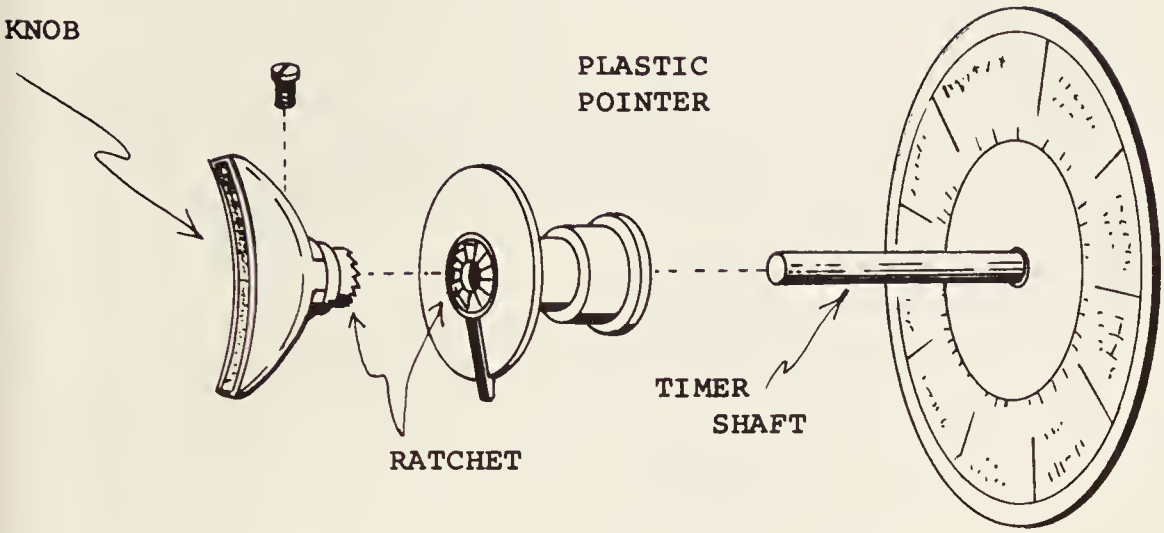
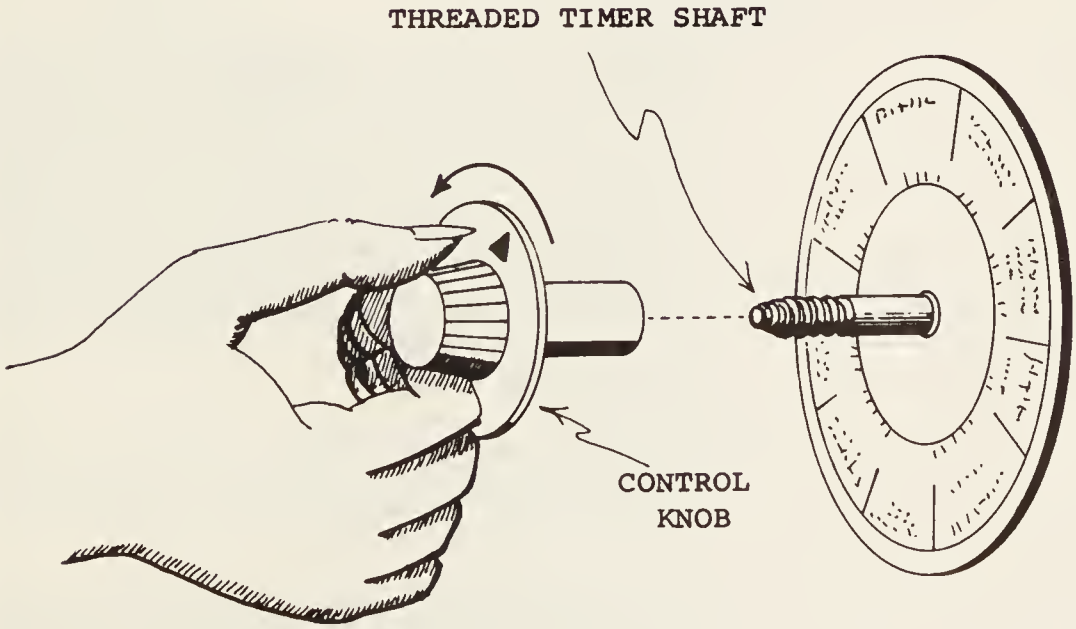


FIG.8



Problem Solver #9

APPLIANCE: Clothes Dryers (Electric or Gas)

PROBLEM: **Dryer runs but clothes do not dry.**

EXPLANATION: A quick check of the air leaving the exhaust duct will probably disclose that there is not much (if any) exhaust air being discharged.

TOOLS AND MATERIALS NEEDED:

(a) a lint filter (or screen) (only if needed)

(b) an exhaust hood and damper assembly (only if needed)

(c) caulking compound (only if hood and damper assembly is replaced)

(d) a wire coat hanger

SOLUTION:

1. Remove the lint screen and check to see if it is clogged.

   SPECIAL NOTE: Most clothes dryers are designed to circulate and discharge about 200 CFM (cubic feet of air per minute) through the dryer and out the exhaust duct system. Accumulations of lint anywhere in the exhaust system can greatly impede air passage. The lint filter, used to trap lint, may be located in different places in different model dryers, but they are always in the exhaust air stream *(Figures 1, 2, 3, and 4)* and should be cleaned before each drying load.

2. If the lint filter is clogged, clean it according to instructions given in the manufacturer's "Use and Care" booklet.

3. After cleaning lint filter, examine it for tears or holes. Damaged lint filters must be replaced.

FIG.1

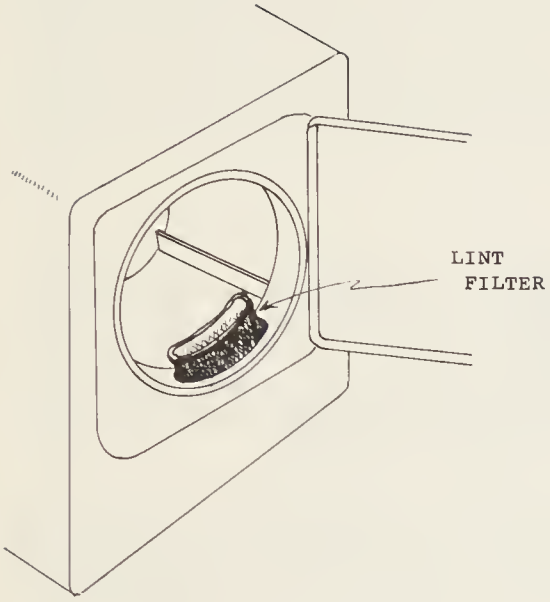


FIG.2

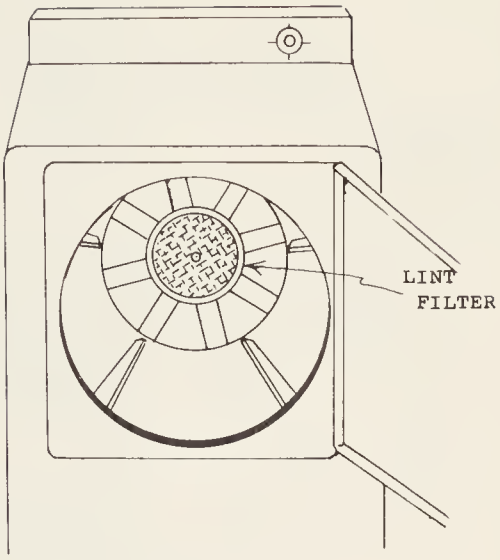


FIG.3

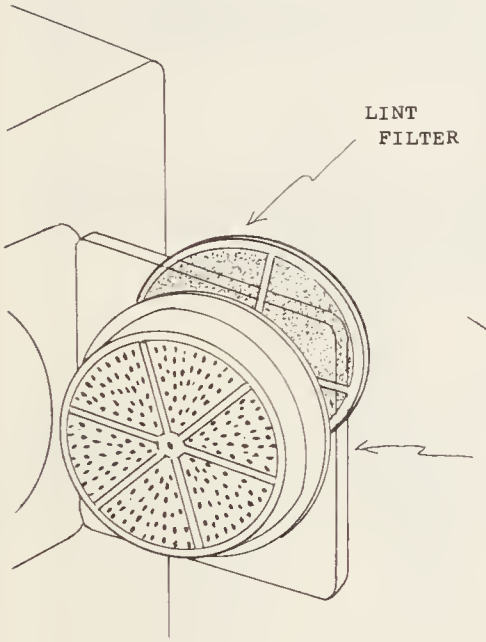
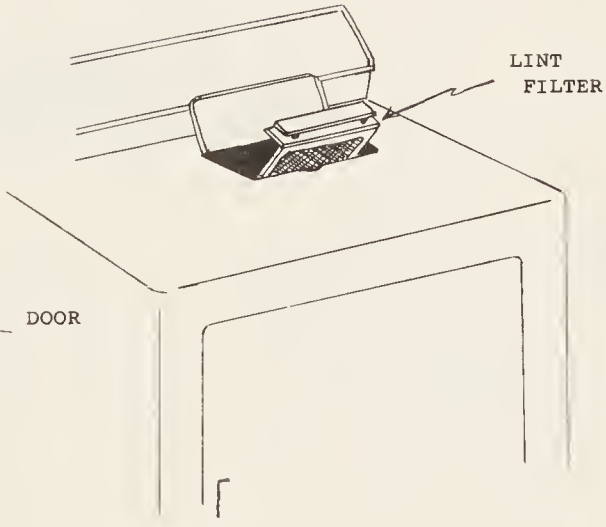


FIG.4



NOTE: Defective lint filters will allow excessive amounts of lint to pass through. Lint that gets through the lint filter can accumulate in the exhaust ductwork and obstruct the entire air flow system. If needed, replacement lint filters are available from authorized manufacturer's parts and supply division, according to make and model of dryer.

4. Check the damper located in the exhaust hood (outside the building) to see that it swings free. *(Figure 5).* If the exhaust hood damper does not swing freely, the entire unit (exhaust hood and damper) must be replaced.

NOTE: The exhaust hood and damper assembly is used to prevent rain and wind from entering the dryer exhaust air system. It is purchased (if needed) as one unit from any local major appliance service or supply store.

5. To replace the exhaust hood and damper unit, first disconnect the duct section that connects to it. *(Figure 6)*

6. From the outside of the building, grasp the hood and, using a twisting-pulling motion, free it from its position. *(Figure 7)*

FIG.5

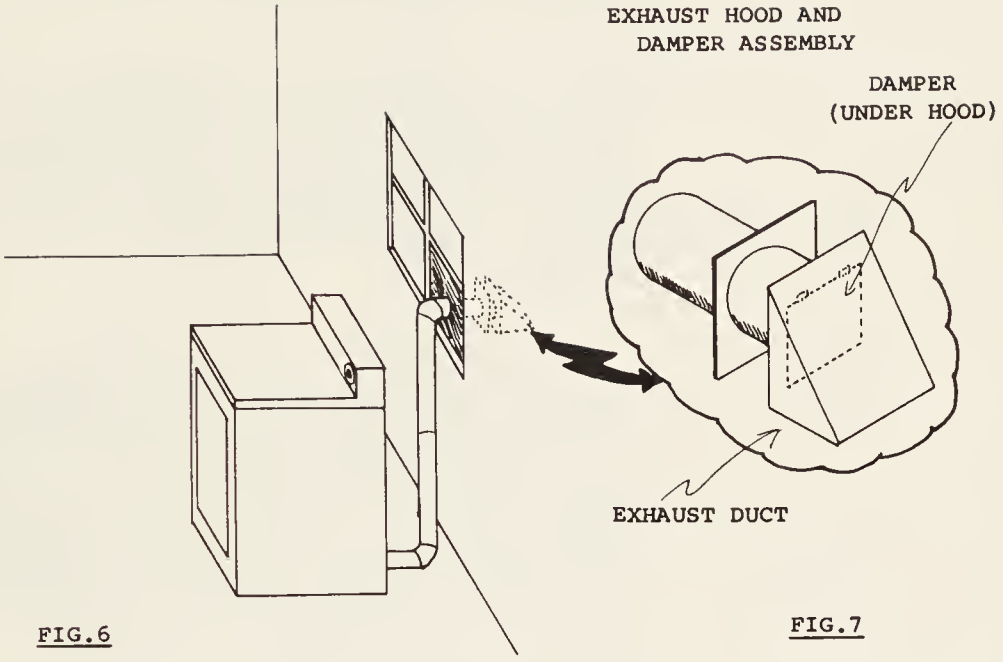


FIG.6

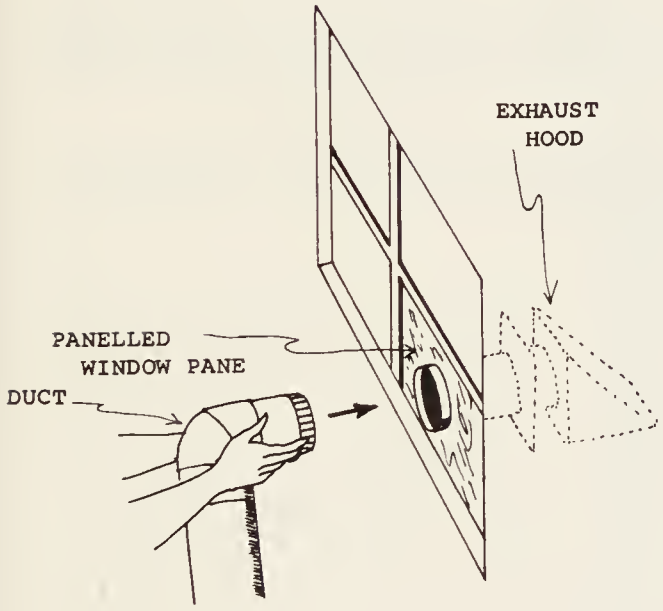
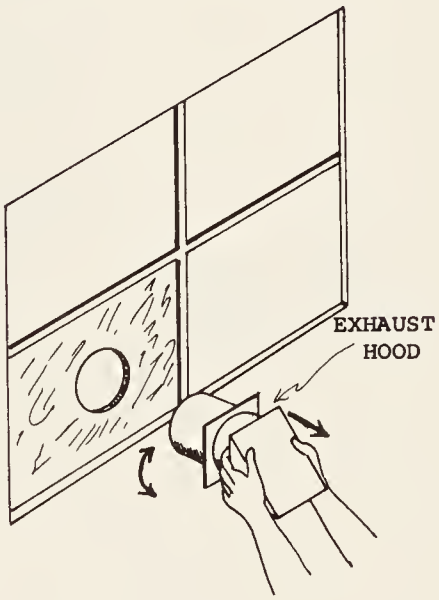


FIG.7



NOTE: Make sure that the replacement hood is caulked where it enters the building to prevent weather leaks. *(Figure 8)* Any caulking compound is suitable for this purpose, such as window glazing compound, putty, etc.

7. Retest dryer operation after servicing the lint filter and exhaust hood assembly. If there is still insufficient air leaving the exhaust duct (at the exhaust hood), then it means that the duct-work is probably clogged and must be cleaned.

NOTE: Two types of ductworks are presently being used for clothes dryers. One is constructed of metal lengths, where straight pieces and elbows are joined together to form the entire ductwork. The second type is constructed of a continuous length of flexible plastic tubing. Cleaning procedures for either type require at least a partial disassembling of the ductwork to gain access to areas where lint is more likely to accumulate.

8. To disassemble flexible plastic type duct, simply pull the duct away from the exhaust outlet at the rear of the dryer. *(Figure 9)*

9. Shake the plastic duct to loosen and remove accumulated lint.

FIG.8

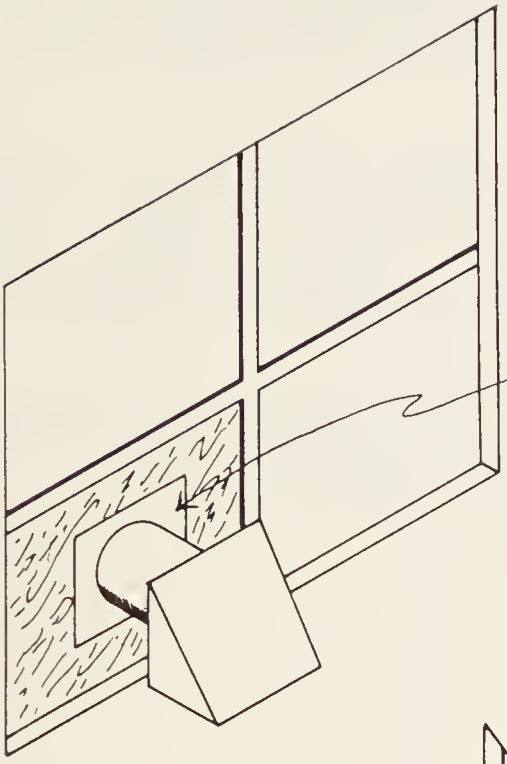
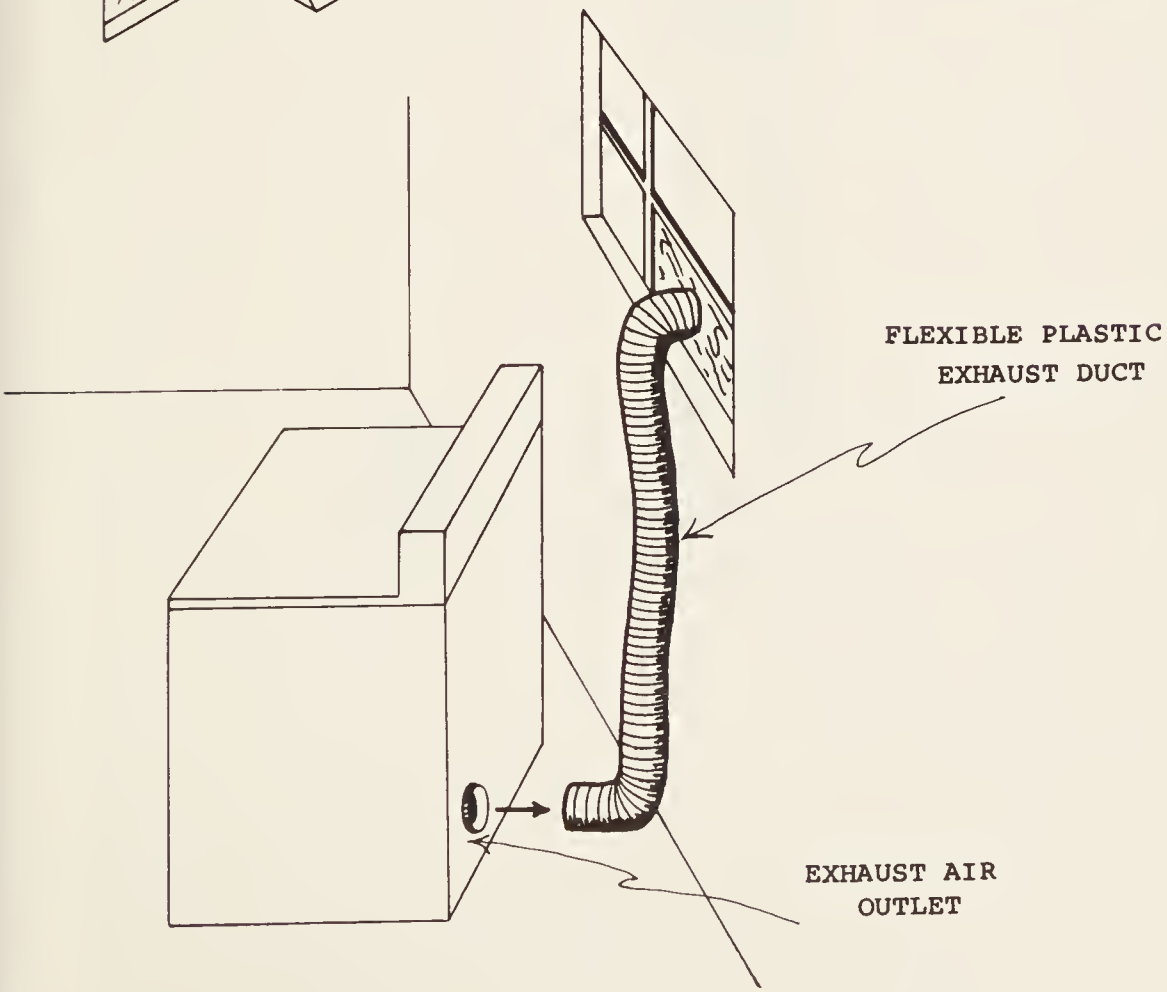

APPLY CAULKING AROUND
HOOD DUCT

FIG.9

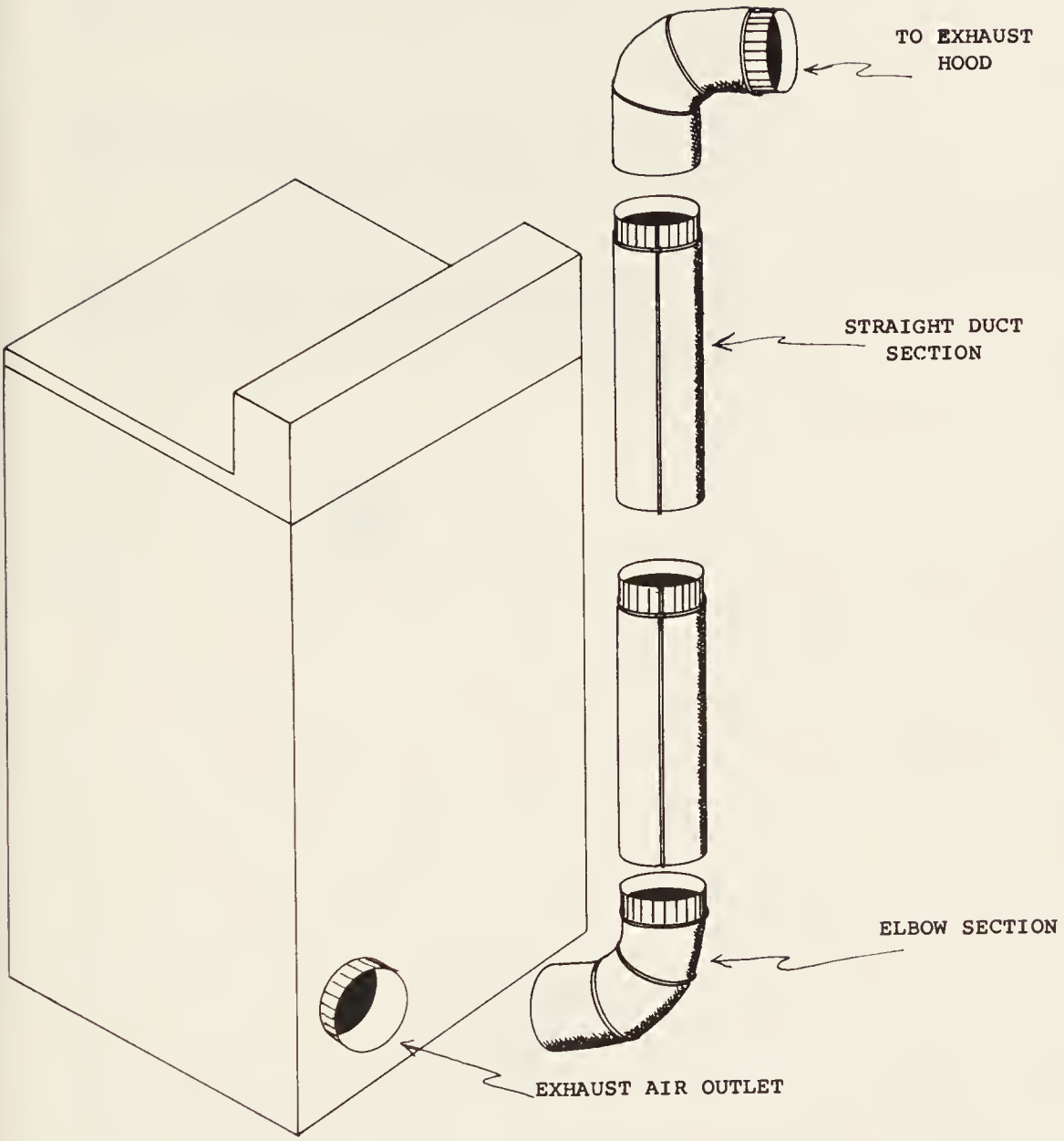

FLEXIBLE PLASTIC
EXHAUST DUCT
EXHAUST AIR
OUTLET

10. To disassemble metal type ducts, first pull the duct away from the exhaust outlet, then pull remaining sections apart (as many as needed) for inspection and cleaning. *(Figure 10)*

    NOTE: A short section of ductwork, located inside the cabinets of all dryers (gas and electric), is used to channel the air flow from the blower to the exhaust air outlet. *(Figure 11)* This internal ductwork is particularly susceptible to clogging from dust and should, therefore, also be cleaned.

11. To clean the internal ductwork, open and reform a wire coat hanger so that it can be used as a snake wire. *(Figure 12)*

FIG.10


TO EXHAUST HOOD
STRAIGHT DUCT SECTION
ELBOW SECTION
EXHAUST AIR OUTLET

12. Insert the looped end of the coat hanger into the exhaust air outlet. Push and wiggle the coat hanger, using a circular motion of the hand, all the way into the duct. Repeat this once or twice and then remove the wire. *(Figure 12)*

13. Operate the dryer in a "cool" position (no heat) to allow the blower fan to blow out dust that was loosened by the wire.

    CAUTION: Do not connect the ducts to the dryer exhaust outlet until step 12 has been completed; otherwise, loosened dust will be blown into the ductwork.

FIG.11

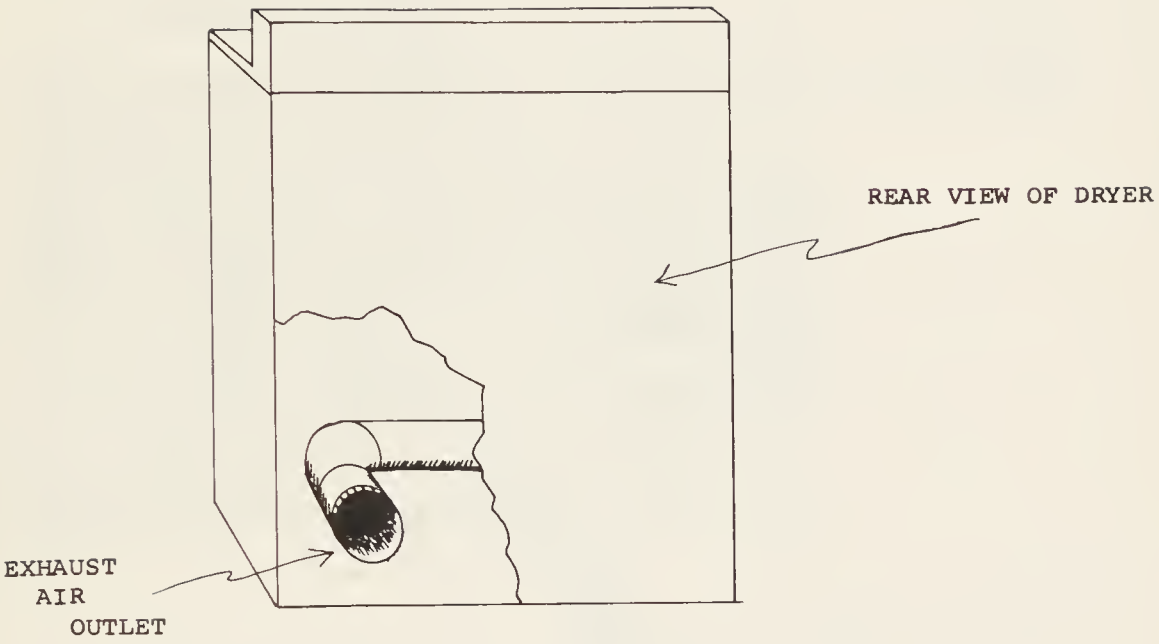
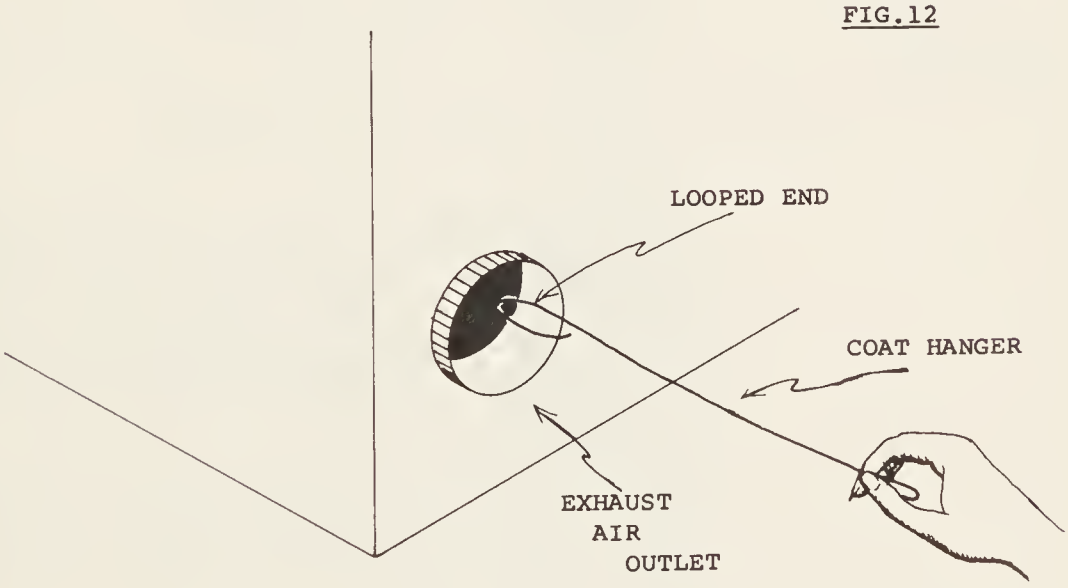

REAR VIEW OF DRYER
EXHAUST
AIR
OUTLET

FIG.12


LOOPED END
COAT HANGER
EXHAUST
AIR
OUTLET

Problem Solver # 10

APPLIANCE: Clothes Dryers (Electric)

PROBLEM: **Dryer drum turns but no heat is produced.**

EXPLANATION: Standard model electric dryers require approximately twice the normal voltage (120 volts) that is supplied by 2-wire electrical outlets in the home. In fact a 3-wire power line supplying either 208, 230, or 240 volts (voltages vary in different locales) is required. In addition, two 30-ampere fuses (or circuit breakers) are connected in the power line to protect it. When, for any reason, both 30-ampere fuses blow, nothing in the dryer will operate. If, however, only one of the fuses blows, the dryer drum may continue to turn but the heating element will not produce heat.

TOOLS AND MATERIALS NEEDED:

(a) a replacement fuse (same electrical rating—in amperes—and type as original)

SOLUTION:

1. Turn the dryer off and check the two power line fuses to see if one has blown.

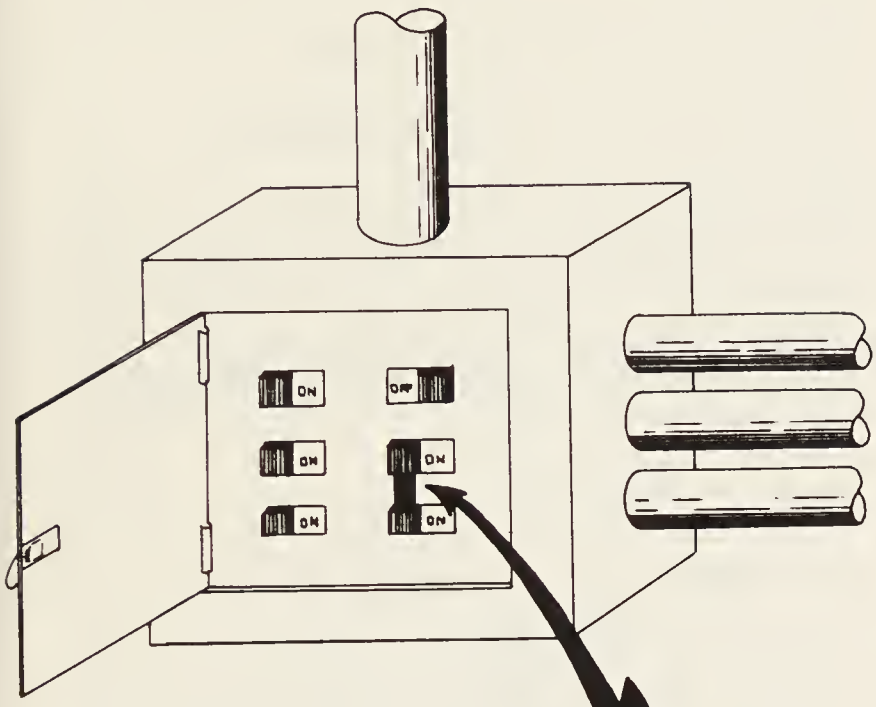
   NOTE: When two circuit breakers are used instead of fuses, the problem as explained above cannot occur. When used in dryer circuits, both circuit breaker handles are linked together with a "coupler" so that when one breaker trips to "off" the other will also be carried to the "off" position. *(Figure 1)* This disconnects all power to the dryer.

2. Refer to section II, General Repair Procedures, Fuses and Circuit breakers, for complete information on how to locate and replace a blown fuse.

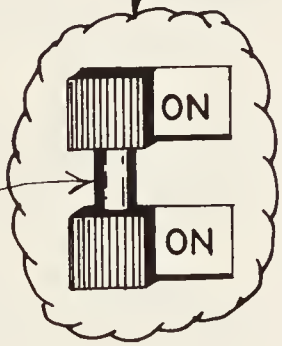
   SPECIAL NOTE: When blown fuses are experienced regularly, consult a qualified appliance technician who can test the dryer for a defect.

FIG.1

CIRCUIT BREAKER BOX



CIRCUIT BREAKER
HANDLES



COUPLER

Problem Solver #11

APPLIANCE: Clothes Dryers (Time Controlled)

PROBLEM: **Clothes do not dry to desired dampness.**

EXPLANATION: Many conditions can cause the drying time to vary even though the timer setting is not changed. This results in clothes being either overdryed or too damp. Dryers with automatic drying cycles are not affected since they are designed to compensate for these conditions.

TOOLS AND MATERIALS NEEDED:

(a) manufacturer's operating instructions

SOLUTION:

1. Check to see that proper drying cycle has been selected and that cycle knob has not been accidentally moved from desired setting. *(Figure 1)*

2. Check drying load to see that clothes have been properly sorted. Bulky and absorbent clothes take longer to dry.

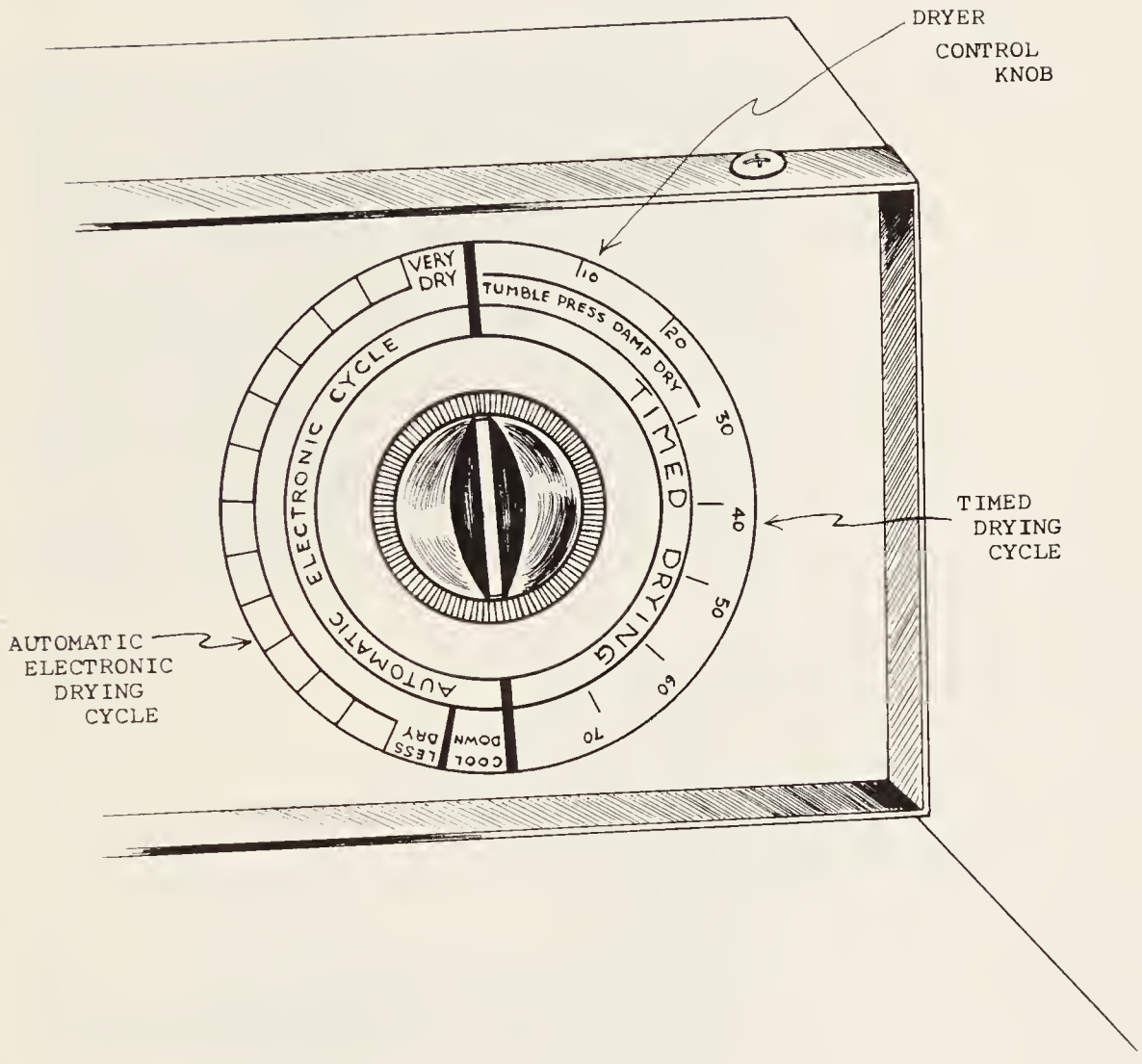
3. Check the size of the load. Small loads dry faster than large loads.

4. If more than one load is to be dryed consecutively, remember that a warm machine requires less time to dry the next load.

5. Keep the lint filter clean. Make sure the exhaust duct system is not obstructing the air flow through the dryer.

SPECIAL NOTE: The amount of moisture left in the clothes from the washer may vary with the efficiency of the washing machine. Accordingly, dryer results will also vary.

FIG. 1


DRYER
CONTROL
KNOB
VERY
DRY
TUMBLE PRESS DAMP DRY
10
20
30
40
50
60
70
TIMED DRYING
AUTOMATIC ELECTRONIC CYCLE
AUTOMATIC
ELECTRONIC
DRYING
CYCLE
LESS
DRY
COOL
DOWN
TIMED
DRYING
CYCLE

Problem Solver #12

APPLIANCE: Refrigerators and Refrigerator-Freezers

PROBLEM: **Frost in refrigerator compartment does not defrost properly.**

EXPLANATION: Excessive frost (ice) in a refrigerator reduces its efficiency because it acts as insulation and reduces the heat absorbing ability of the cooling section called the "evaporator." Frost on the evaporator forms from the moisture carried into the refrigerator by the outside (room) air. Under normal conditions, the defrosting system of the refrigerator periodically melts the frost and allows it to flow as water, through a drain system, into a pan beneath the refrigerator where it evaporates back into the room air. Excessive frost buildup is often caused by a defective door gasket which permits a constant room air flow through the refrigerator compartment.

TOOLS AND MATERIALS NEEDED:

(a) a sheet of newspaper

(b) a bottle of household cleaning ammonia

(c) a pencil

(d) a sheet of cardboard (having approximately twice the thickness of a matchbook cover)

(e) a pair of scissors (to cut the cardboard)

(f) a screwdriver

(g) a nutdriver—¼-inch size

SOLUTION:

1. Test door gasket for air leaks.

2. Tear a strip (approx. 10″ × 2″) from a sheet of newspaper.

FIG. 1

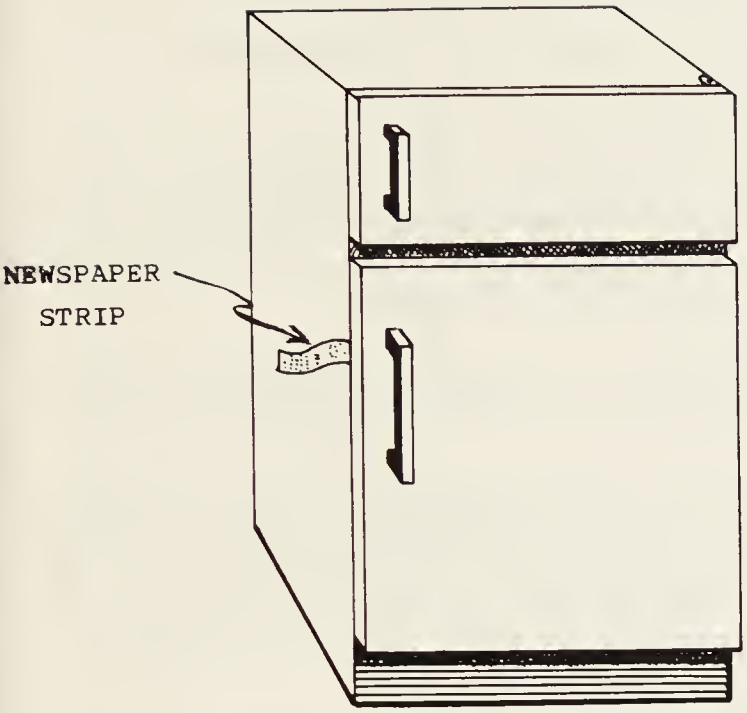
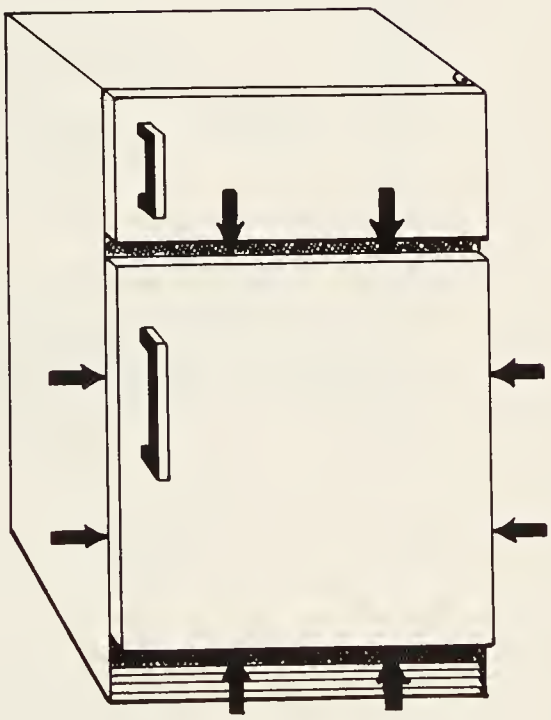


FIG. 2

TEST GASKET AT
POINTS ALONG DOOR
AS INDICATED
BY ARROWS



3. Close the refrigerator door on the paper strip. *(Figure 1)*

   NOTE: The paper strip must be held firmly by the door.

4. Pull gently on paper strip to remove it. If paper strip can be removed without pressure, or if it falls free, the door gasket is not making a proper seal at that point.

5. Repeat the test around the door by placing the paper strip at points shown in *Figure 2.*

6. Examine the door gasket at points where paper strip is not held firmly. Look for the following conditions which could prevent the door gasket from seating itself properly against the cabinet to form a good seal:

   a. Particles of food which have adhered to the cabinet or door gasket.

   b. Tears in the door gasket, or pieces of the gasket missing.

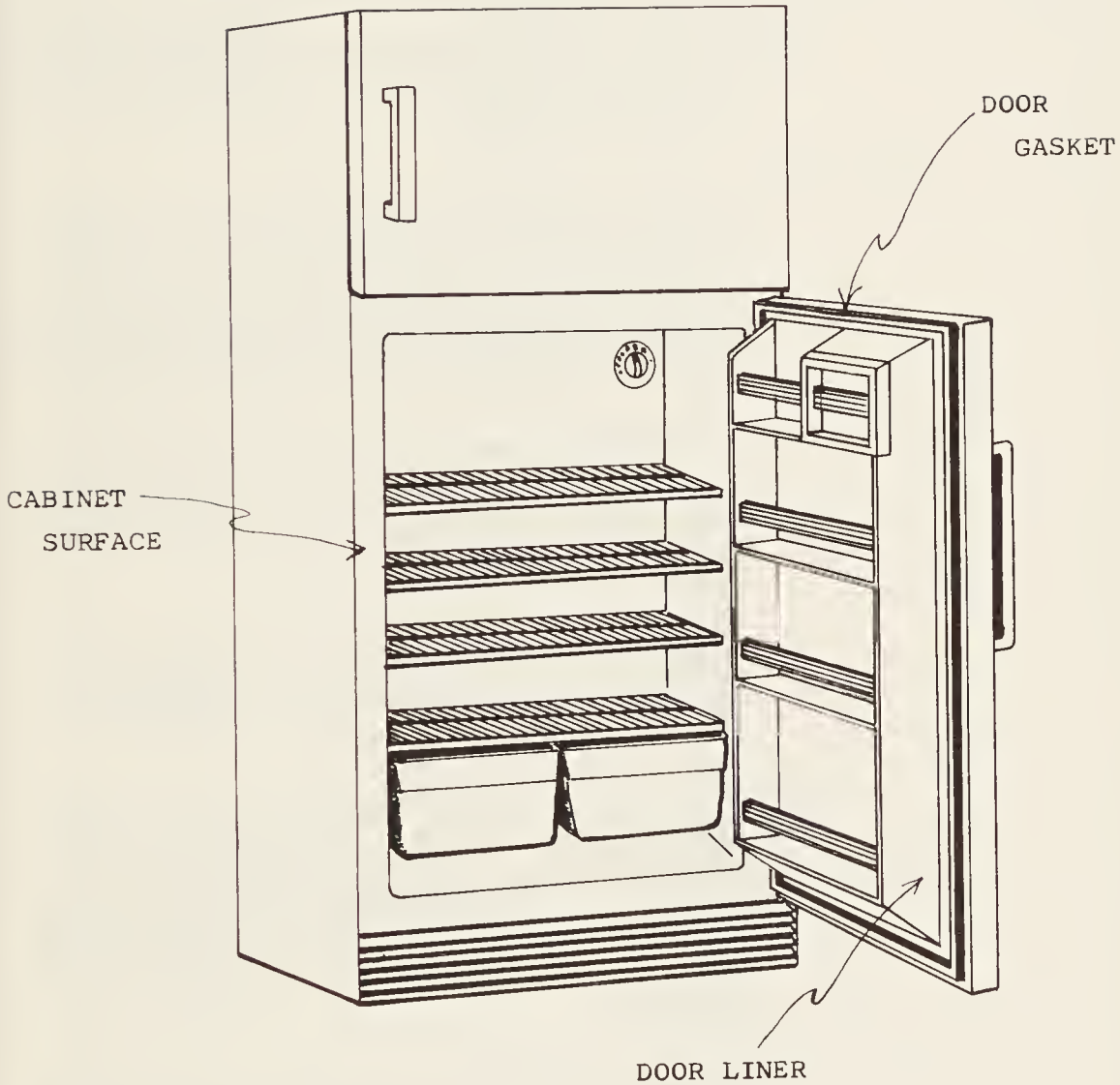
   c. In older models, brittle and cracked gasket (no longer resilient).

7. If examination of gasket and cabinet surface reveals that particles of food or other substances are present, clean both the gasket and cabinet surface with a strong solution of household ammonia. *(Figure 3)*

8. After cleaning, retest the gasket with the newspaper strip.

9. If examination of gasket discloses that there are pieces missing, or that it has become dry and brittle, having little or no resiliency, then the gasket must be replaced.

FIG. 3



NOTE: Replacing a refrigerator door gasket is a long job because there are many small screws to loosen and tighten, but it is not beyond the average person's capability. The decision about whether to have the gasket replaced by an appliance technician or to do it yourself should be based upon the amount of time and effort that can be afforded. Steps 17 through 22 outline the procedure for replacing refrigerator door gaskets.

10. If the door gasket appears to be clean and has no defects, the gasket may be adjusted to restore a good seal.

NOTE: All gaskets (except for the new magnetic gaskets which may be considered self-adjusting) can be adjusted by placing one or more thin cardboard strips of varying lengths directly behind sections of the gasket that do not contact the cabinet surface with enough pressure to form a good seal.

11. To adjust the gasket, first pencil mark the beginning and end of each section of the gasket that fails to hold the test newspaper strip firmly. *(Figure 4)*

12. Grasp the gasket between the pencil marks and lift it away from the door so the screws used to secure it are exposed. *(Figure 5)*

13. Loosen (do not remove) all the gasket screws within the pencil marks. Turn them counterclockwise with a screwdriver or nutdriver, whichever is needed. *(Figure 6)* This should allow the gasket to come away slightly from the door.

14. Cut a strip of cardboard as long as the distance between the two pencil marks by one-half inch wide. Place the cardboard behind the door gasket between the two pencil marks and retighten the gasket screws to secure the gasket and strip in place. *(Figure 7)*

FIG. 4

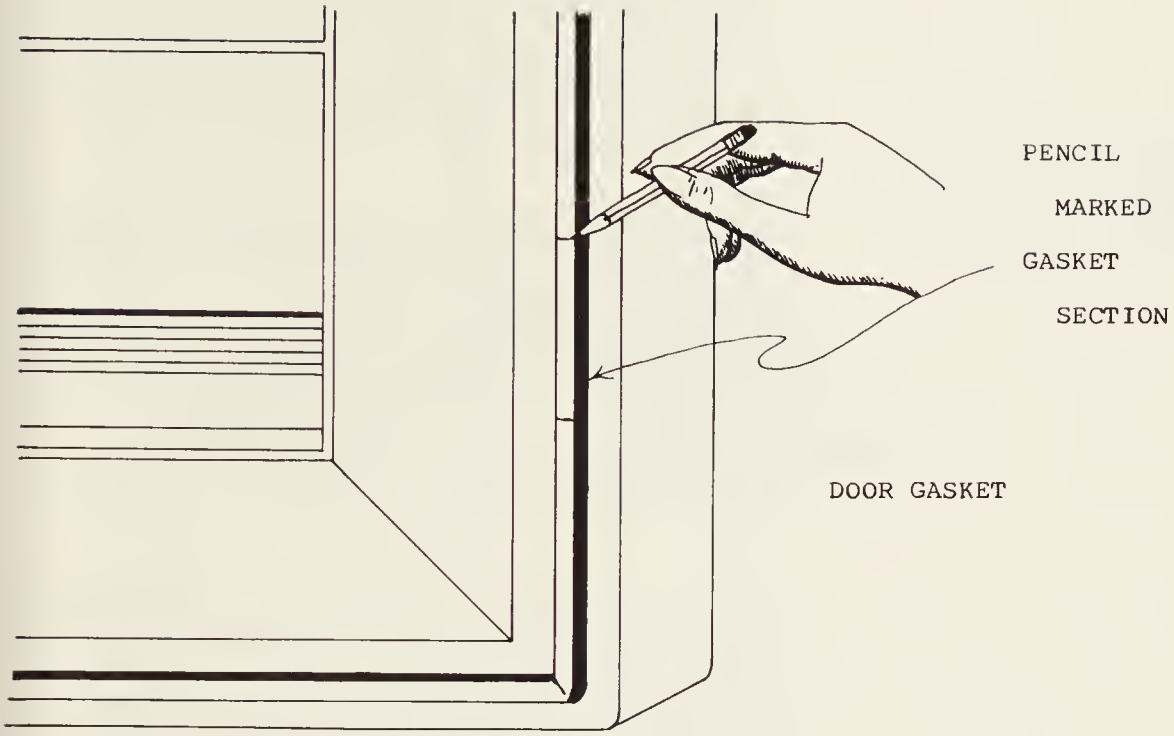
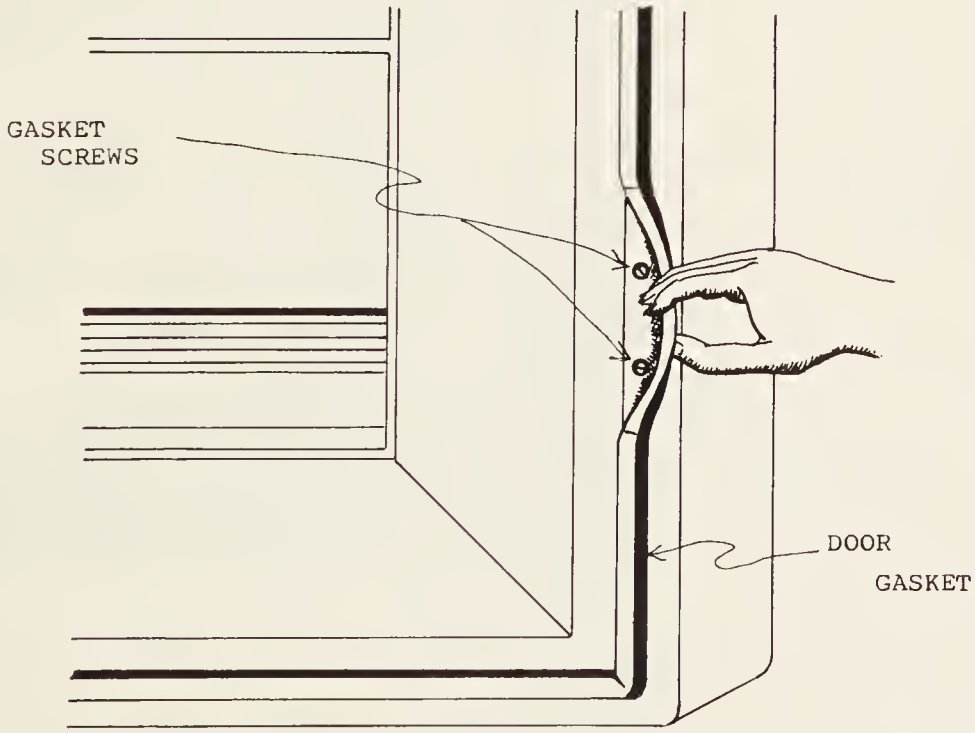

PENCIL
MARKED
GASKET
SECTION
DOOR GASKET

FIG. 5


GASKET
SCREWS
DOOR
GASKET

15. Retest the gasket section with the newspaper strip. If the gasket still does not hold the newspaper strip firmly, place more cardboard strips behind the gasket until it does.

    CAUTION: One or two cardboard strips are usually enough to bring the door gasket into proper contact with the cabinet for a good seal. Do not place more cardboard strips behind the gasket than are necessary. This will cause the gasket section to bulge forward and intensify the problem.

16. If the gasket is found to be defective (tears, brittle, etc.) it must be replaced.

    NOTE: Refrigerator door gaskets are made available by the manufacturer in "pre-formed" construction. This means that the gasket is made to conform to the refrigerator door shape exactly. Do not remove the defective gasket until the replacement gasket has been purchased.

17. To remove the old, defective gasket, lift the gasket along the top of the door to gain access to the top row of gasket screws, as described in step 12 and illustrated in *Figure 5.*

18. Remove about three screws, using either a screwdriver or nutdriver depending upon the type of screwhead used. Pull the gasket out from under the metal molding or door liner (depending upon design). *(Figure 8)*

    NOTE: Two types of screw cutouts are used in gaskets. One is an open slot that allows the gasket to come free by loosening the gasket screws. *(Figure 8)* The other is a hole requiring that the gasket screws be removed in order to free the gasket. *(Figure 9)*

FIG. 6

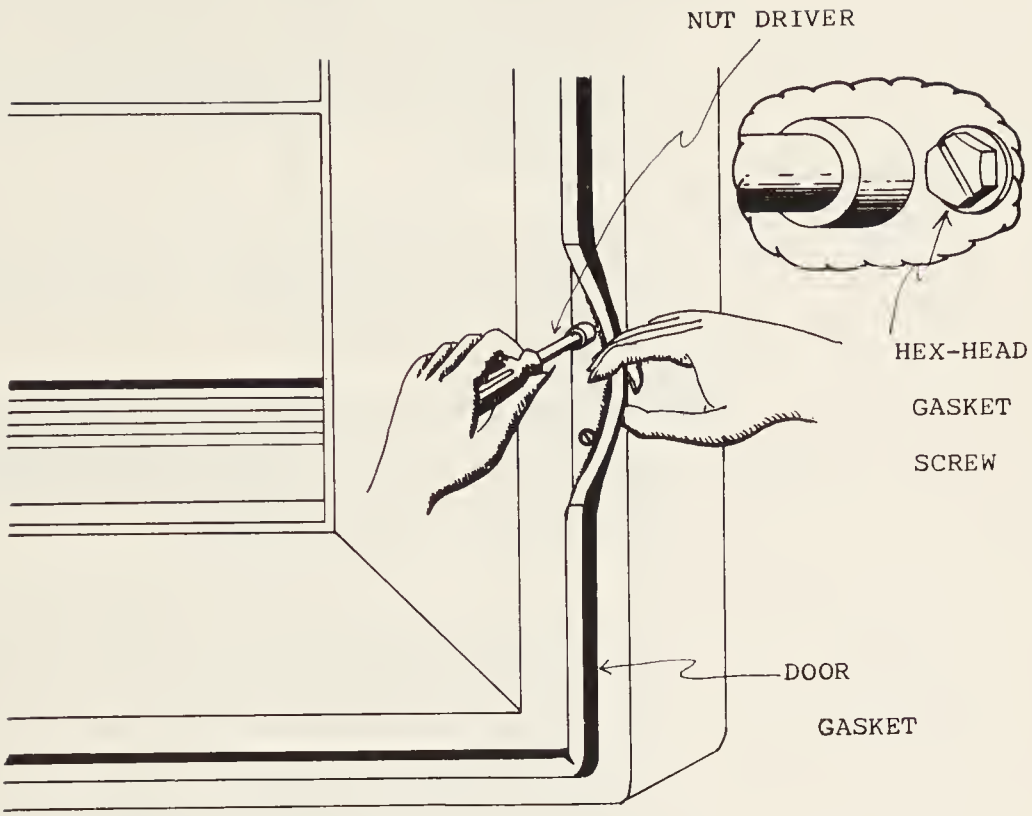
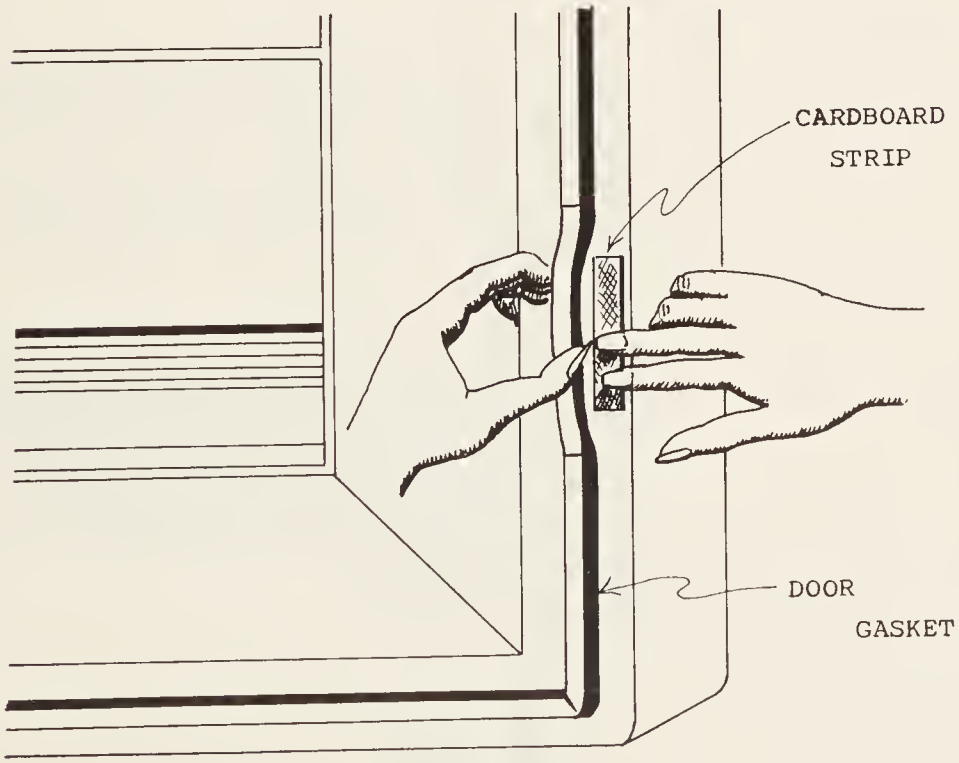

NUT DRIVER
HEX-HEAD
GASKET
SCREW
DOOR
GASKET

FIG. 7


CARDBOARD
STRIP
DOOR
GASKET

19. If by loosening the screws the gasket can be freed (gasket is constructed with screw slots), then proceed to only loosen all the screws around the gasket until the entire gasket can be removed.

    NOTE: A metal molding in front of the gasket is used on some refrigerators to hold the gasket in place. Such metal moldings do not have to be removed. *(Figure 8)*

20. If after loosening screws the gasket does not come free (gasket is constructed with screw holes), then the screws must be completely removed to free the gasket.

    NOTE AND CAUTION: On some model refrigerators, especially those requiring the complete removal of gasket screws, no metal molding is used. The gasket is seated behind the door liner. *(Figure 3)* When the gasket screws are removed, the door liner will come off with the gasket. Take care, therefore, to take out food, and bottles that may be stored on the door liner to prevent breakage when it is removed.

21. To install the new gasket, begin with the top center of the door and work out to the left and down, then to the right and down. Complete the installation, ending at the bottom center of the door. Take extra care when fastening gasket in corners to avoid distorting the gasket.

    SPECIAL NOTE: The best preventive maintenance for refrigerator and freezer door gaskets is frequent cleaning with dishwashing detergent. Food substances that accumulate on the gasket and cabinet surface can make the gasket stick to the cabinet. This then can cause the gasket to tear when the door is opened.

FIG. 8

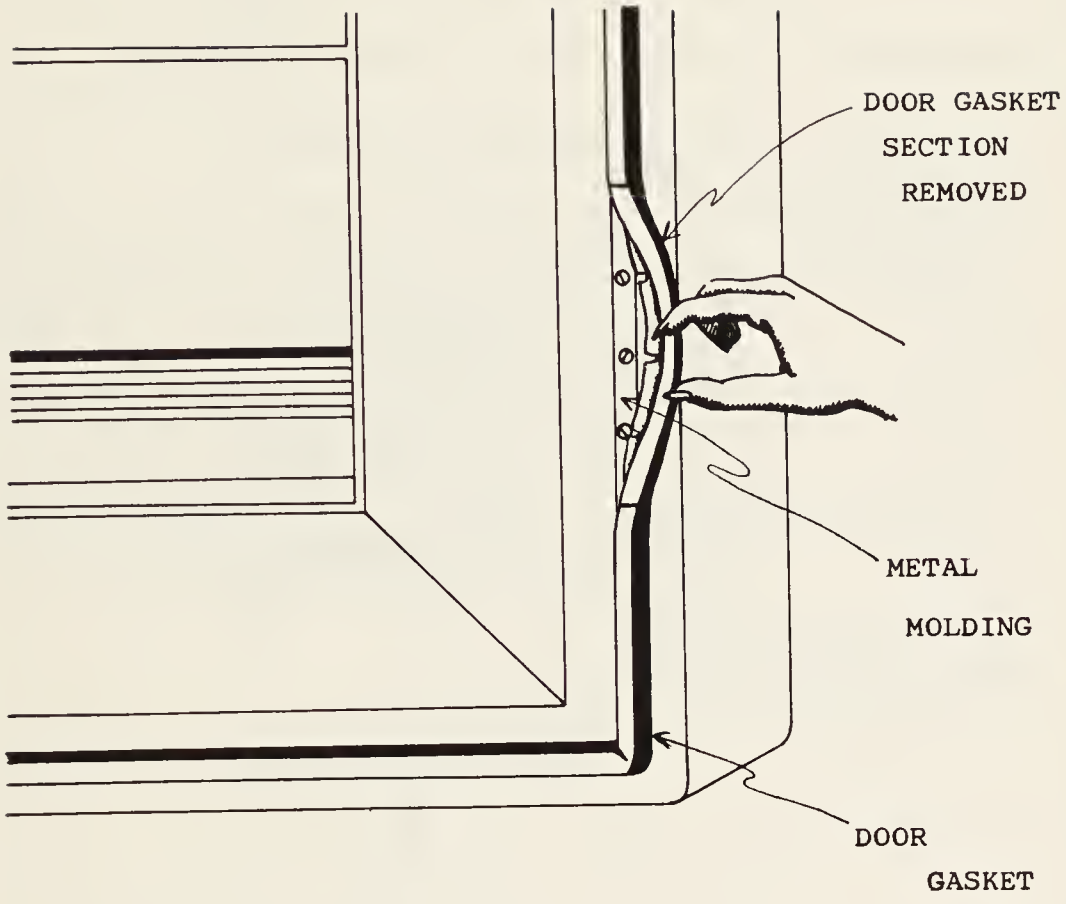
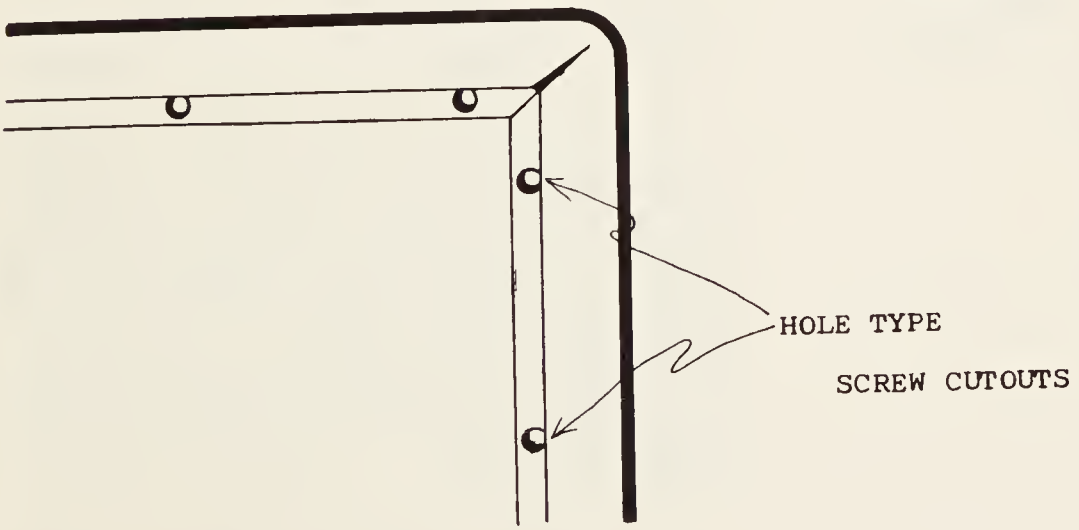


FIG. 9

CORNER SECTION OF

DOOR GASKET

(ENLARGED)



Problem Solver # 13

APPLIANCE: Refrigerators and Refrigerator-Freezers

PROBLEM: **Interior light does not come on.**

EXPLANATION: This may or may not be a simple case of a burned-out light bulb. In virtually all refrigerators and freezers, the interior light comes on automatically when the compartment door is opened and is turned off when the door is closed. The component responsible for operating the light bulb is a push-button switch located between the cabinet and door. *(Figure 1)* Due consideration must, therefore, be given this switch if replacing the light bulb does not solve the problem.

TOOLS AND MATERIALS NEEDED:

(a) a tabletop lamp (or other portable appliance)

(b) a cleaning pad (abrasive type)

(c) an emery board (used for fingernails)

(d) a screwdriver (small)

(e) a replacement light bulb

SOLUTION:

1. Check to see that power is present at the electrical wall outlet.

2. To test for electric power at the wall outlet, plug a tabletop lamp or other portable appliance known to be in working order in the wall outlet being used by the refrigerator. If the test lamp or other appliance does not work, the electric line should be checked for a blown fuse. See Section II, General Repair Procedures, Fuses and Circuit Breakers for complete details.

FIG. 1

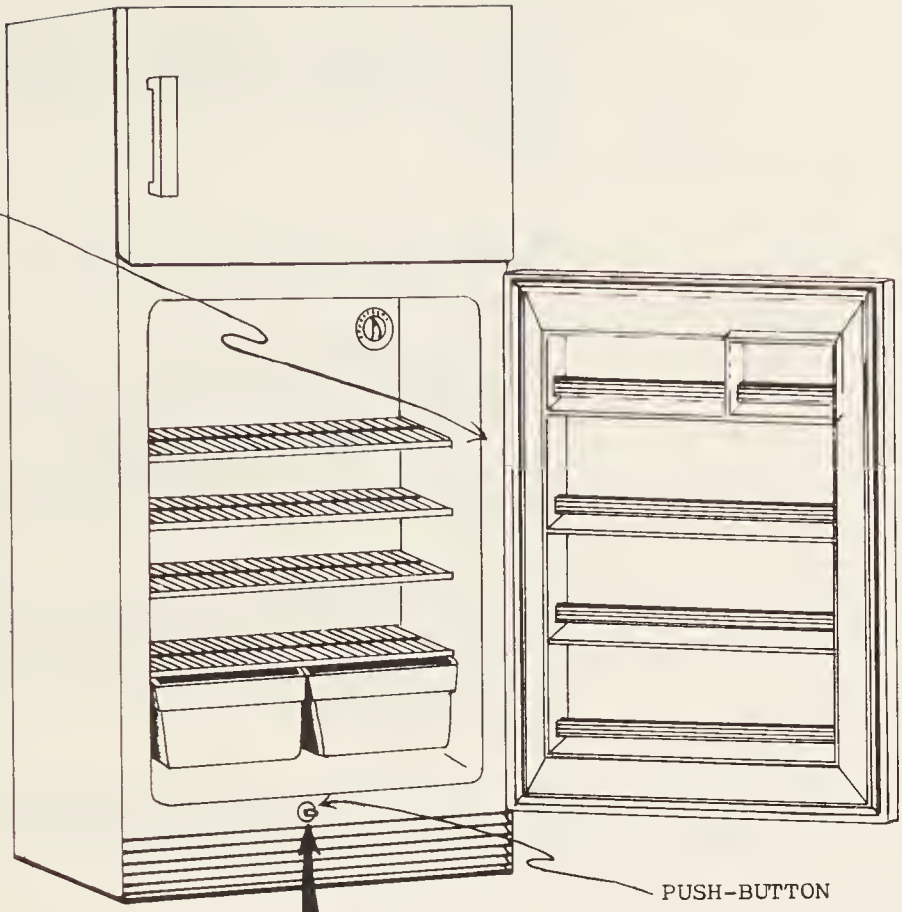
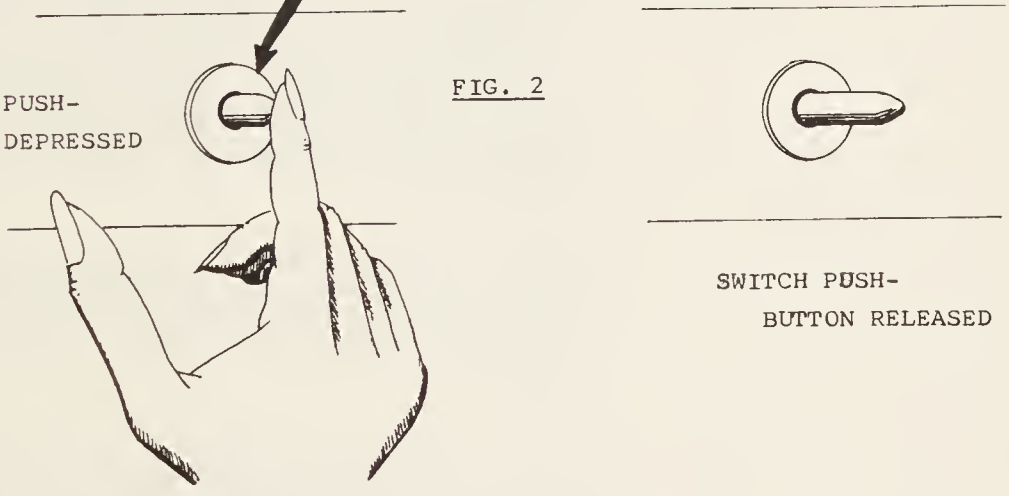

OTHER POSSIBLE LOCATION OF PUSH - BUTTON LIGHT SWITCH
PUSH-BUTTON LIGHT SWITCH

FIG. 2


SWITCH PUSH-BUTTON DEPRESSED
SWITCH PUSH-BUTTON RELEASED

3. If step 2 proves that electric power is present at the wall outlet, proceed to check the mechanical function of the push-button door switch.

   CAUTION: Make certain that the refrigerator plug is connected to the electric outlet.

4. Open the refrigerator door and locate the push-button portion of the switch that protrudes from either the bottom of the cabinet or along the side of the cabinet directly behind the hinged section of the door. *(Figure 1)*

5. Press the switch button as far as it will go into the cabinet then release it suddenly to allow it to spring out quickly. Repeat this once or twice. *(Figure 2)*

6. If the switch button moves sluggishly or sticks, grasp the button and pull it out from the cabinet as far as it will go.

   NOTE AND CAUTION: Food spillage and/or accumulation of cooking grease on the switch button can cause it to stick. If pulling the button out manually makes the interior light come on, clean the switch button thoroughly with an abrasive type cleaning pad. The switch button should move in and out without binding. DO NOT lubricate the switch button.

7. If, after cleaning, the switch button is still sluggish or sticks occasionally when depressed manually, examine it again to see if it is straight.

   NOTE: In some rare instances, the switch button may have become distorted (bent). In such cases, the button has difficulty in passing through the switch hole. *(Figure 3)*

FIG. 3

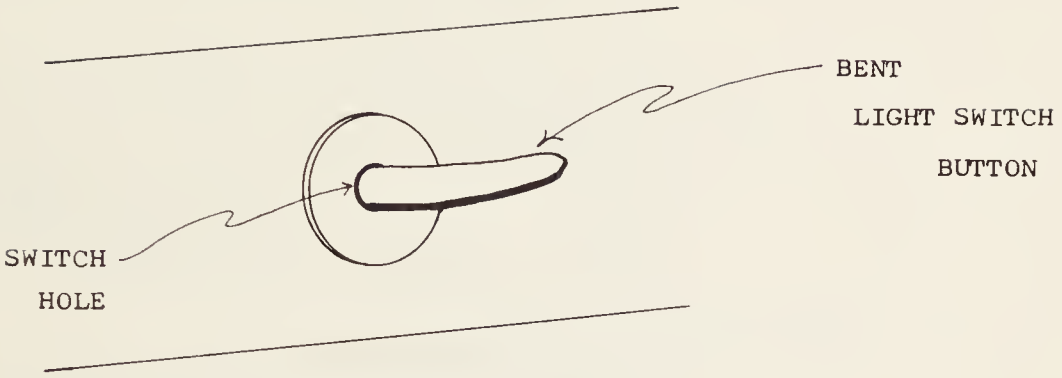
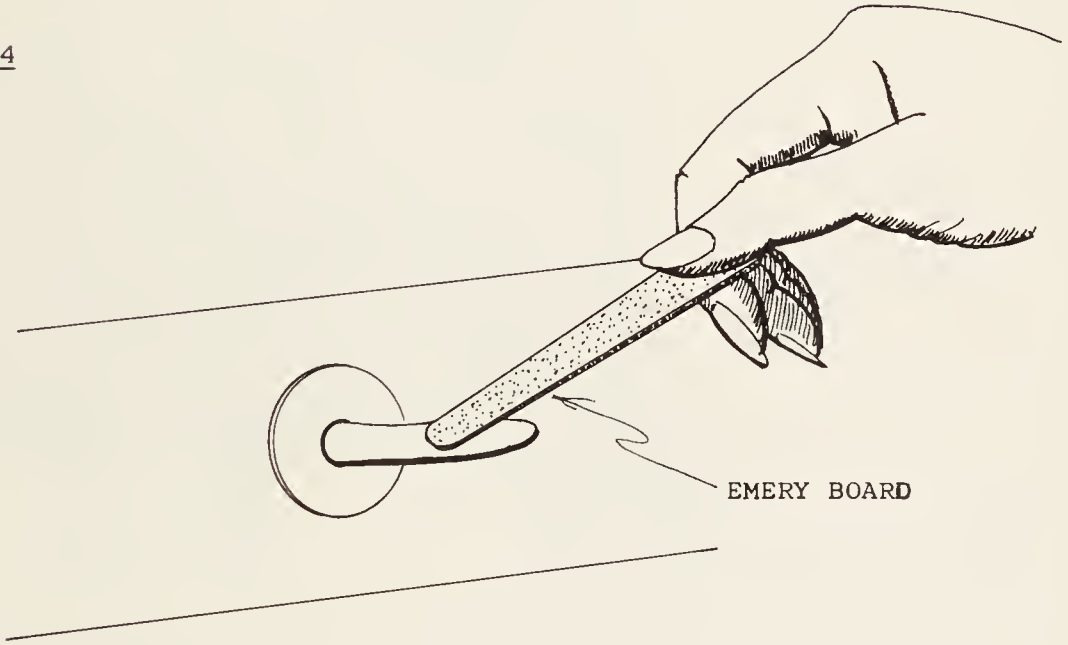


FIG. 4



8. If the switch button appears bent, carefully reduce the thickness of the switch button by sanding it with an emery board. (Figure 4) Try to maintain the roundness of the button. Test it for free movement after each slight sanding. Stop sanding it as soon as it moves freely.

9. If the push-button switch appears to be operating well mechanically (button moves freely) but interior light does not come on, a new light bulb must be tried. On some models, however, a light bulb shield must be removed before the light bulb can be reached.

NOTE: Light bulb shields have been designed in as many different shapes and sizes as there are different makes and models of refrigerators. Most, however, are designed to be removed by simply applying slight pressure to their bottoms to release small pin or tab supports. *(Figure 5)* A few are found to also include a mounting screw to secure them *(Figure 6)* and some may even require that a control knob be removed before the light shield can be freed. *(Figure 7)* Many manufacturers supply specific directions for replacing the interior light bulb in their customer's instruction booklet. This is the best reference source and should be consulted if it is still available. *Figures 5, 6, and 7* illustrate the common varieties of light shields used and should serve as an adequate guide for successfully removing light shields.

FIG. 5

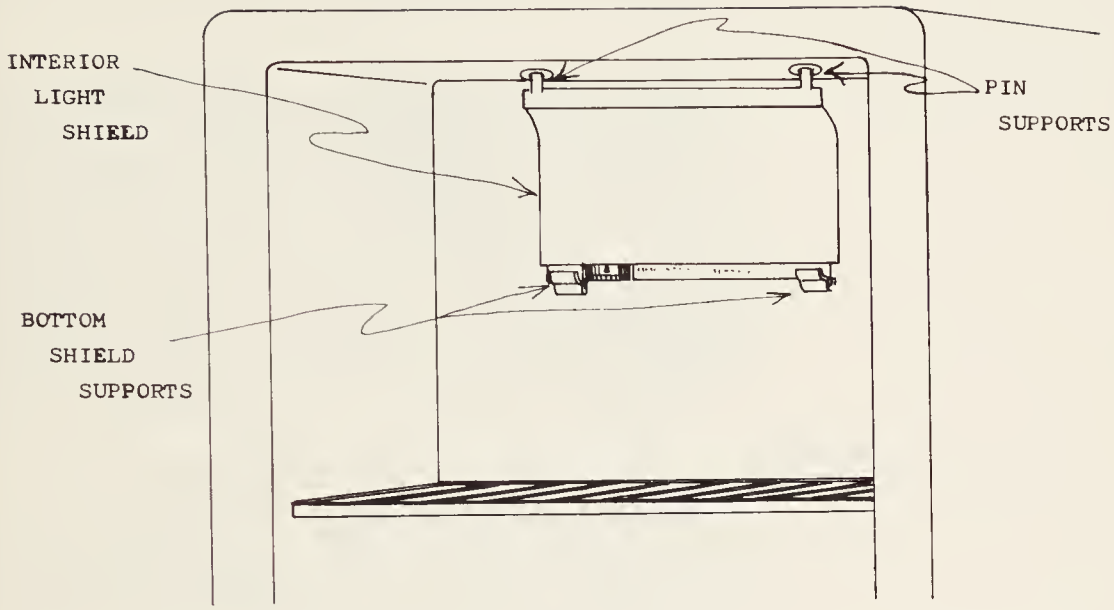


FIG. 6

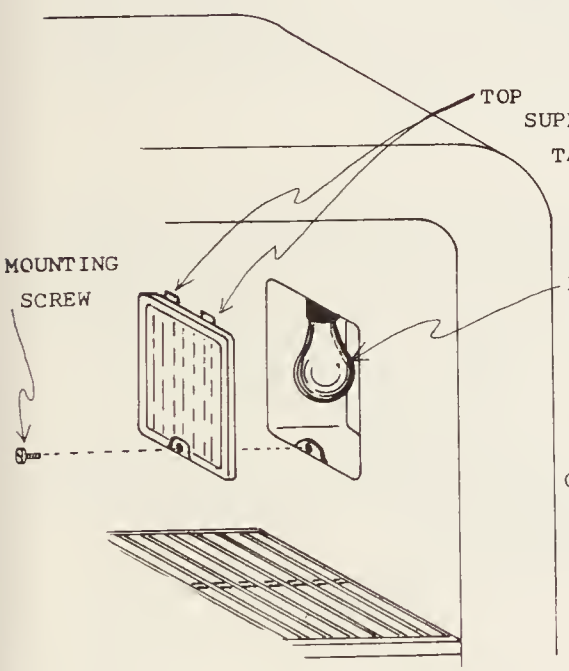
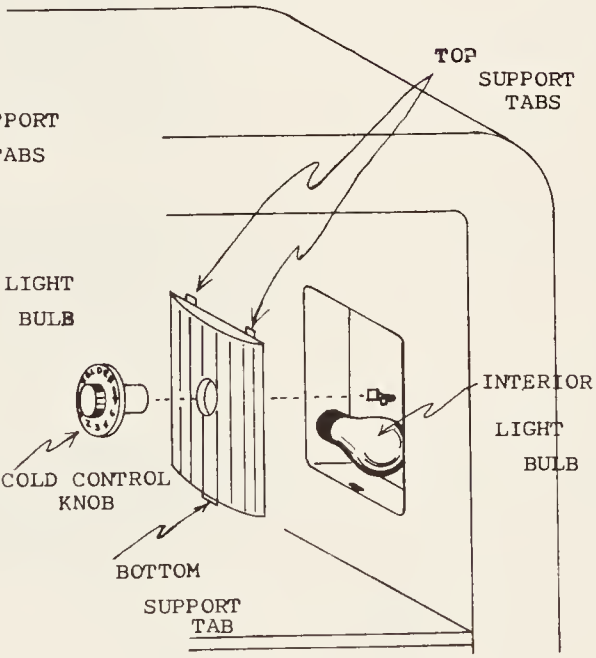


FIG. 7



10. Remove the line cord plug from the wall outlet before attempting to remove the light bulb.

    SPECIAL NOTE: Light bulbs used in refrigerators and freezers are especially designed for this purpose and are marked with the word "appliance" on the glass portion of the bulb. They may be found to vary in size from 25 watts to 40 watts. In addition, the type of bulb base may be either screw type *(Figure 8)* or bayonet type. *(Figure 9)* Make certain that the replacement lamp correctly matches the electrical size (in watts) and the base (screw type or bayonet) of the original light bulb.

11. Identify the type of light bulb being used. If a screw base bulb is being used, it may be replaced as are all other type of light bulbs; turn it counter-clockwise to remove it and clockwise to install it.

12. To remove a bayonet type bulb, grasp the bulb, push it into the socket, and twist it counter-clockwise. The bulb can then be pulled straight out of the socket.

13. To install a replacement bayonet bulb, align the two pins on the base of the bulb with the two channels in the socket. Press the bulb into the socket as far as it will go, twist the bulb clockwise and release it. *(Figure 10)*

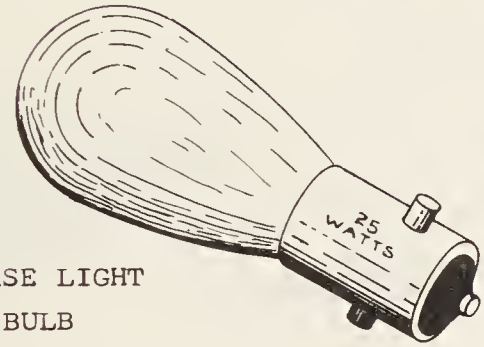
14. Replace the light shield, then connect the line cord plug to the wall outlet to complete the light bulb replacement.

FIG. 8

SCREW BASE APPLIANCE

LIGHT BULB

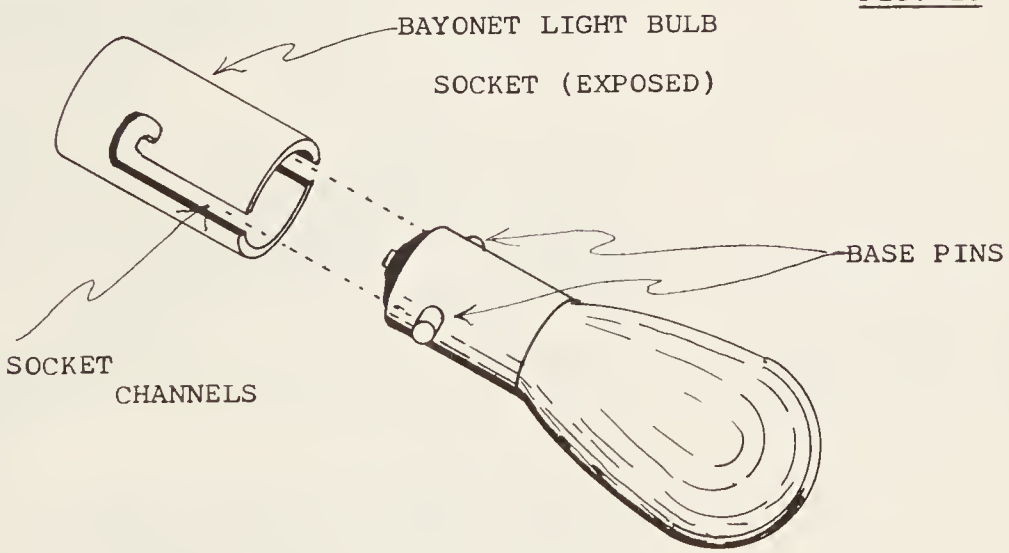
FIG. 9



BAYONET BASE LIGHT

BULB

FIG. 10



Problem Solver #14

APPLIANCE: Refrigerators and Refrigerator-Freezers

Problem: Shelf sags.

EXPLANATION: In modern refrigerators, plastic shelf supports (often referred to as "hooks") are used to support food storage shelves. If one of the shelf supports breaks, the portion of the shelf it held will drop, causing the shelf to tilt.

TOOLS AND MATERIALS NEEDED:

(a) a hacksaw blade

(b) a roll of electrical or masking (paper) tape

(c) a screwdriver (small)

(d) a hammer

(e) a replacement plastic shelf support (may be purchased locally from major appliance parts suppliers or directly from manufacturer's parts supply division)

NOTE: Have the new plastic shelf support ready before beginning the repair. Shelf supports must be purchased for the specific make and model refrigerator. Two different types are illustrated in *Figure 1* as examples.

SOLUTION:

1. Remove the affected shelf from the refrigerator.

2. Cut the broken shelf support off as close to the interior cabinet liner as possible with a hacksaw blade. Use light, moderate strokes, and

FIG. 1

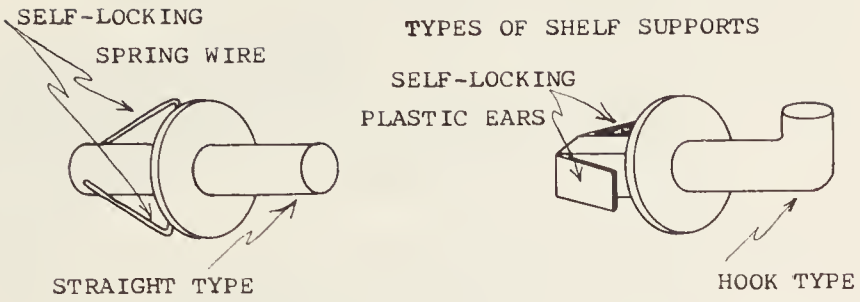


FIG. 2

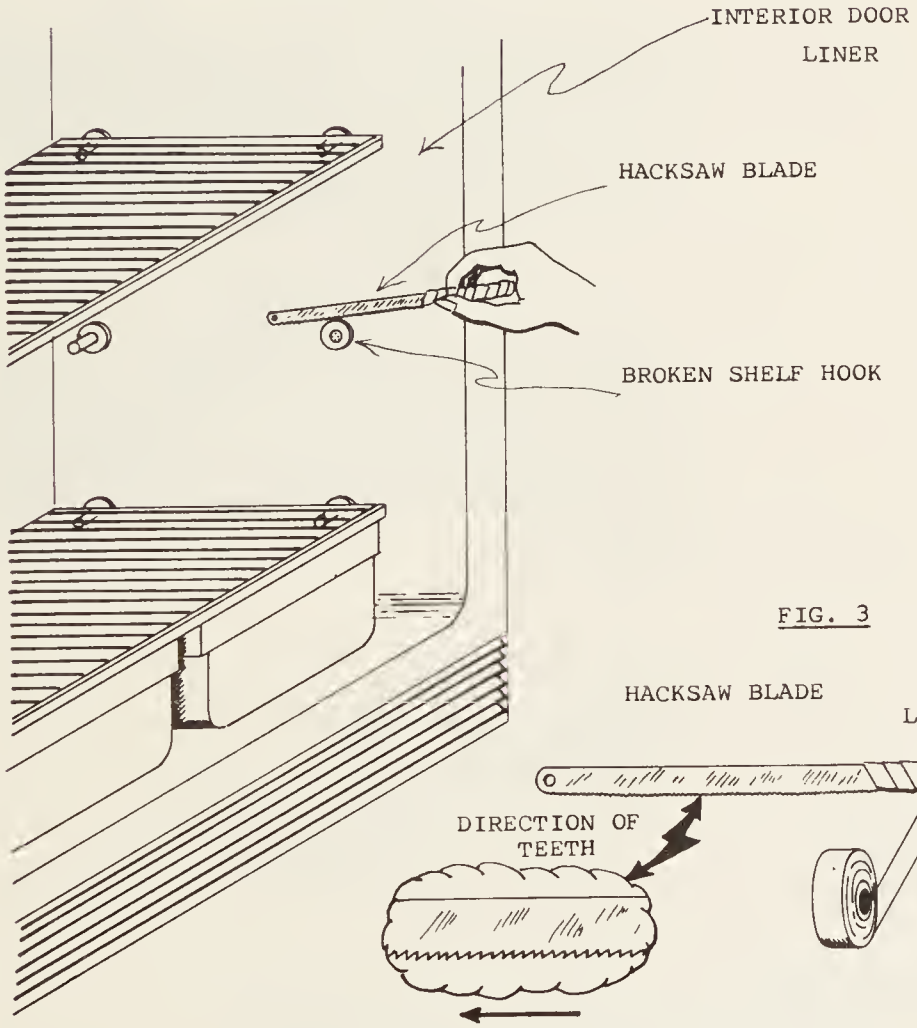


FIG. 3

take care not to allow the hacksaw blade to scratch the cabinet liner. *(Figure 2)*

NOTE: The hacksaw blade may be prepared to make it more comfortable to hold by wrapping electrical or masking tape around the end of the blade away from which the teeth face. *(Figure 3)*

3. Drive the remaining portion of the shelf support into the cabinet liner with a screwdriver and hammer to clear the mounting hole. *(Figure 4)*

4. Hold the replacement shelf support in its correct position (hook facing up for hook-shaped supports) and press the support firmly into the mounting hole until it locks itself to the interior cabinet liner. *(Figure 5)*

5. Replace the shelf to complete the repair.

SPECIAL NOTE: To prevent damaging refrigerator shelves and shelf supports, avoid cramming. Shelf supports will normally sustain the weight of a fully loaded shelf. They can, however, be broken if large items and/or quantities of food are jammed between shelves.

FIG. 4

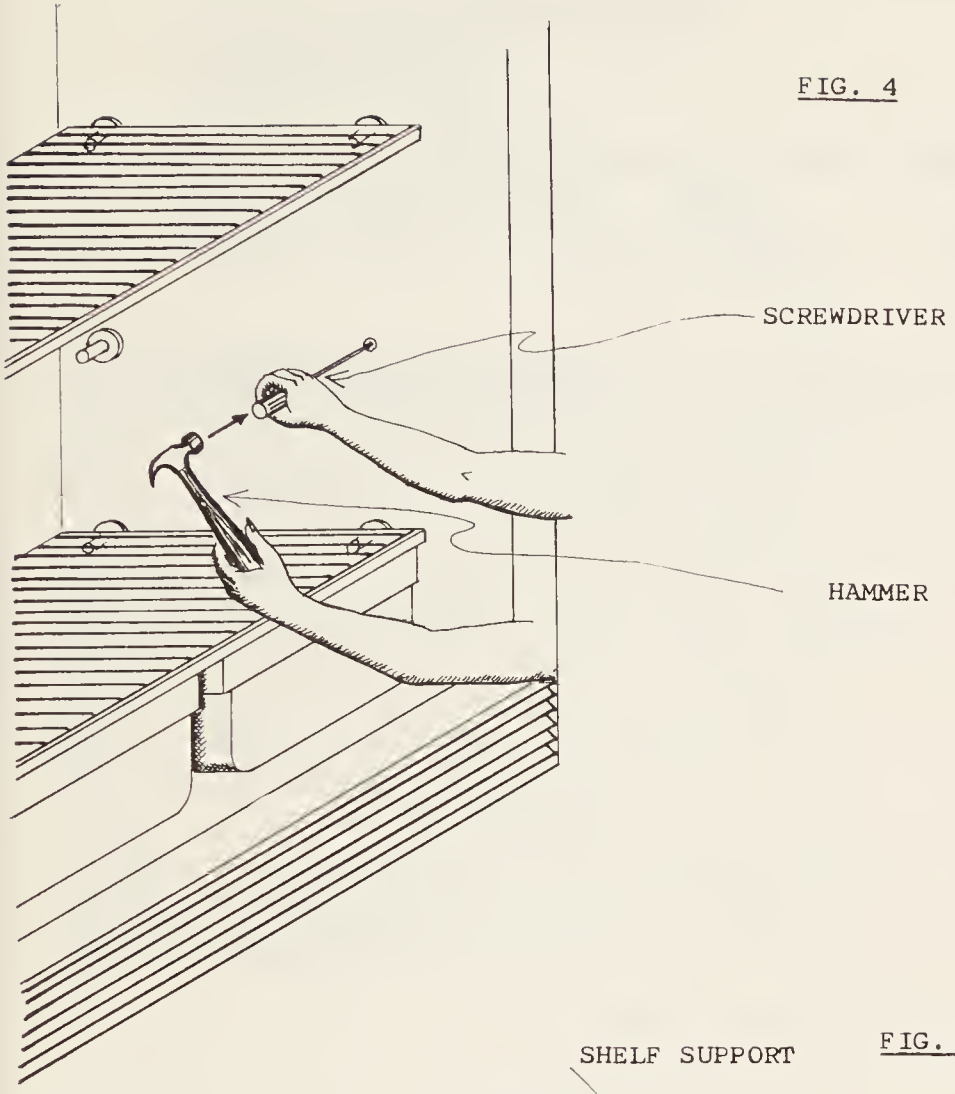
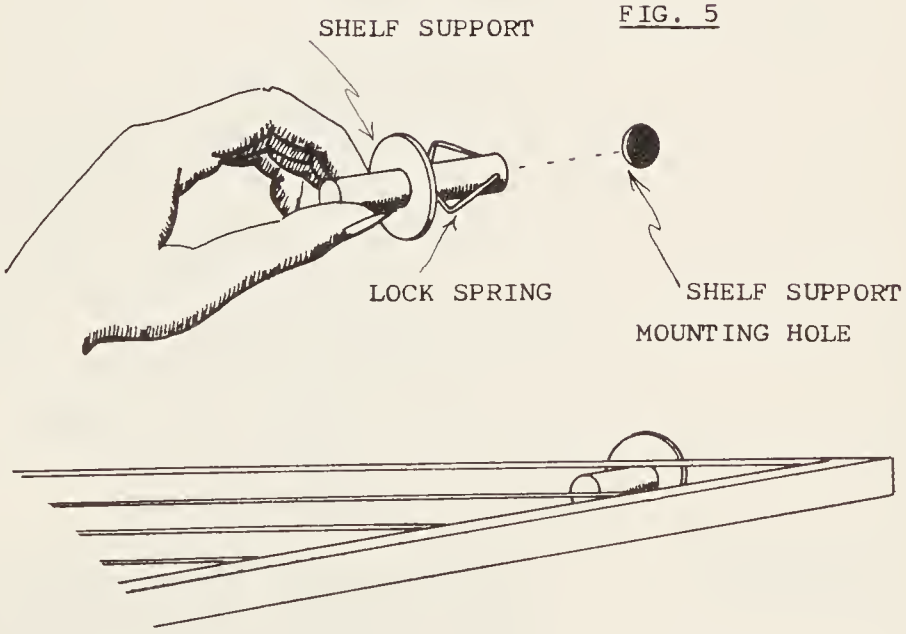

SCREWDRIVER
HAMMER

FIG. 5


SHELF SUPPORT
LOCK SPRING
SHELF SUPPORT
MOUNTING HOLE

Problem Solver #15

APPLIANCE: Refrigerator and Refrigerator-Freezers

PROBLEM: **Water accumulates in bottom of refrigerator compartment.**

EXPLANATION: Water that pools on the bottom of the refrigerator compartment is defrost water that has not been drained. With self-defrosting refrigerators, melted frost drips from the evaporator (cooling coil) into a "drip rail" (trough) and then flows into a plastic drain tube. In some refrigerator models, the drain tube leads through the back cabinet wall directly to the defrost water pan beneath the refrigerator. In others, the drain tube empties onto the bottom of the refrigerator compartment which has a small drain opening that empties into the defrost water pan under the cabinet. In both drain systems, a clogged drain tube or drain opening (in bottom of cabinet) will prevent the defrost water from flowing out of the cabinet into the defrost water pan.

TOOLS AND MATERIALS NEEDED:

(a) a pair of tweezers

(b) a small pocketbook or make-up mirror.

(c) a small piece of lint-free cloth

(d) bicarbonate of soda

(e) a wide bowl (preferably glass)

(f) a pair of universal pliers

SOLUTION:

1. Check the drain tube opening in the drip rail for accumulation of debris (lint, bits of paper from packaging materials, etc.) which may have caused an obstruction. *(Figure 1)* Use a

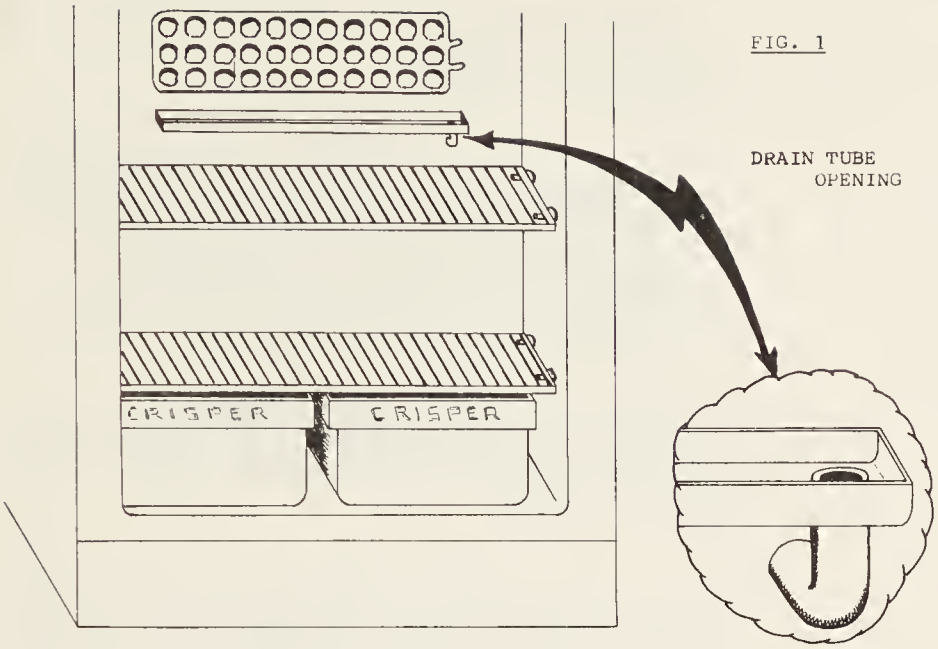


FIG. 1

DRAIN TUBE
OPENING

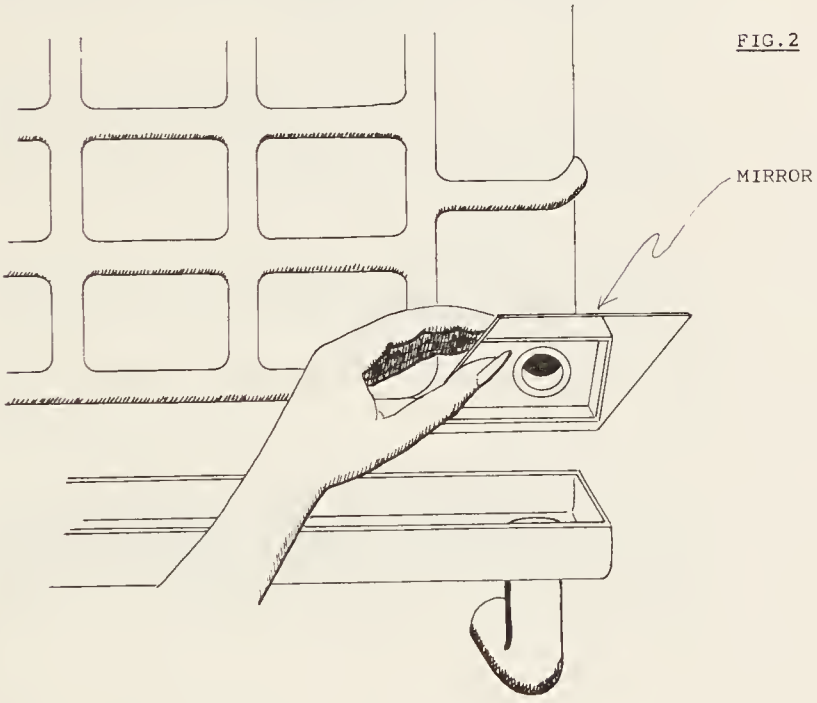


FIG.2

MIRROR

small pocketbook or make-up mirror to aid inspection. *(Figure 2)*

NOTE: Defrost water mixed with debris and bacteria forms a slime-like substance which clings to and obstructs the drain system.

2. Clean the drain tube opening by picking out foreign substance with tweezers.

3. Remove any solid particles that may be in the drip rail, and wipe the inside with a clean, lint-free cloth.

4. Mix a strong solution of bicarbonate of soda in a cup of hot water and pour it into the drip rail to flush the drain tube clean. Repeat as often as necessary until the solution drains readily.

NOTE: Refrigerators designed with drain openings in the bottom of the cabinet will require that these be checked for obstruction.

5. To check and clean the bottom drain, first remove the lower storage bins to gain access to the drain opening. *(Figure 3)*

NOTE: Drain tube with this type of system extends outside the cabinet liner down to the bottom.

6. Grasp the drain cover and pull it off. *(Figure 4)*

7. Clean the drain cover strainer and drain opening, then flush with strong solution of hot water and bicarbonate of soda. Replace the drain cover strainer.

FIG.3

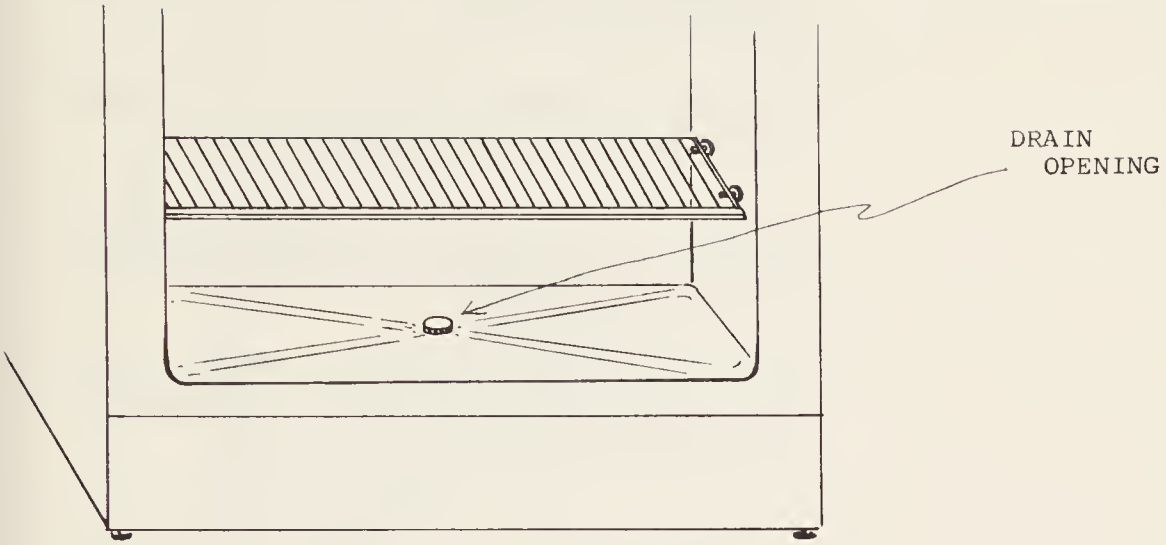
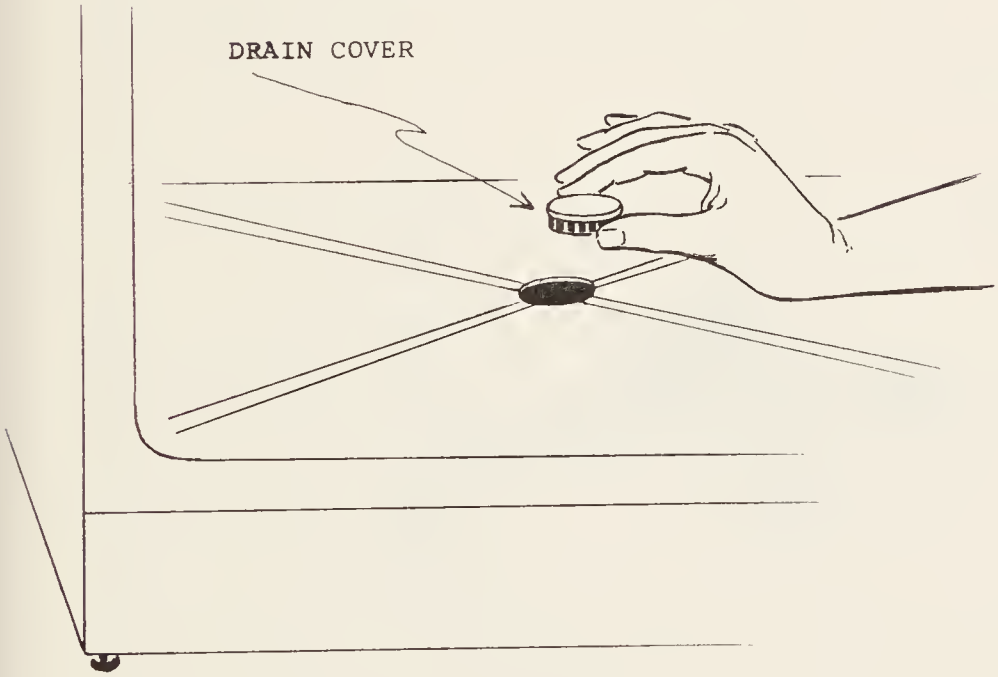


FIG. 4



NOTE: A good follow-up to cleaning the defrost water drain system should really include cleaning the defrost water pan.

8. Remove the base grille (kick plate) and pull pan completely out. *(Figures 5 and 6)*

NOTE: Consult owner's manual (instruction booklet) for specific details on removing base grille and pan.

9. Take the pan to the sink and wash it thoroughly with hot water and a disinfectant type cleaning agent.

10. Replace the pan and base grille to complete the cleaning.

FIG. 5

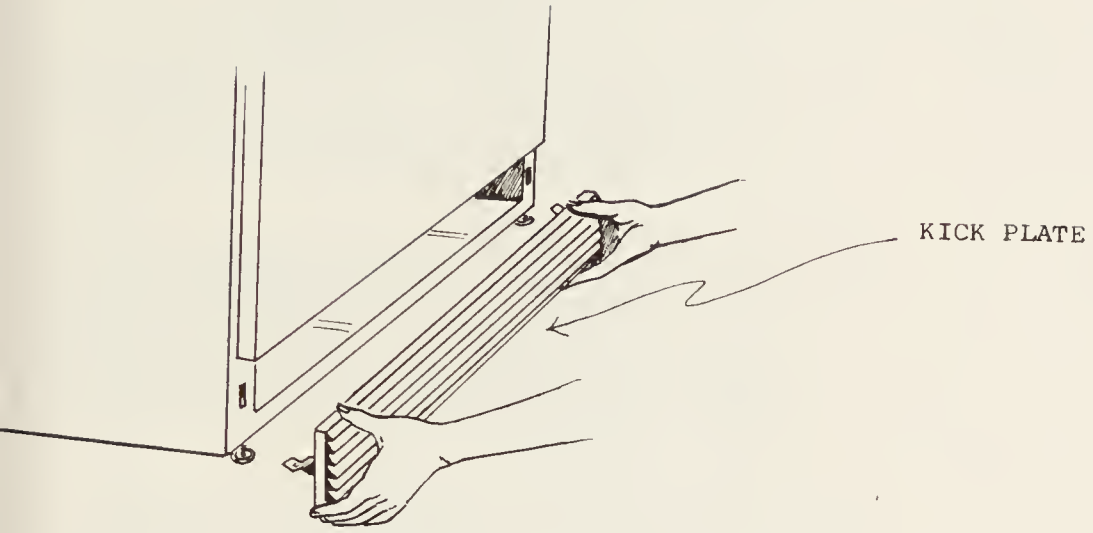
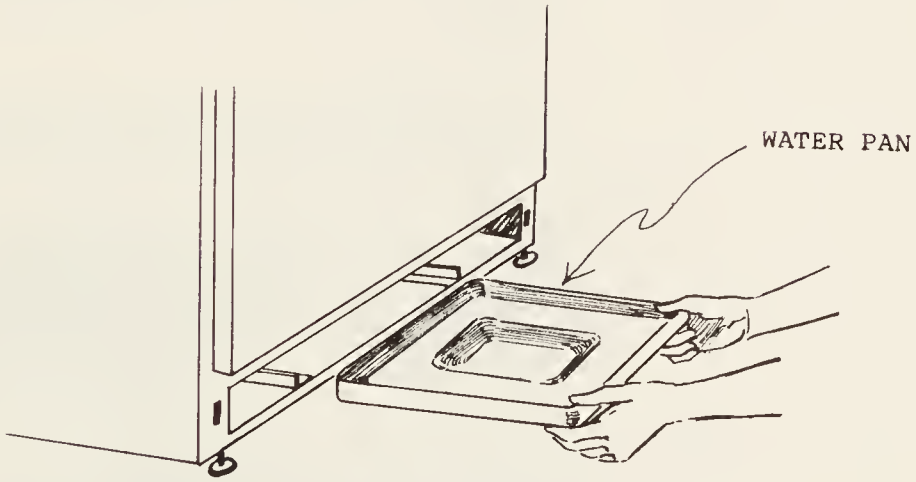


FIG. 6



SPECIAL NOTE: The defrost water flow en route to the defrost water pan can be affected if, as in some extreme situations, the refrigerator is severely tilted. As a final check, therefore, test to see that the refrigerator is level.

11. Fill a wide glass bowl with water to about one inch from its brim. Place the bowl in the center of an upper shelf. *(Figure 7)*

12. Notice the water level with respect to the brim of the bowl. If the refrigerator is level, the water will be of equal distance from the brim around the entire bowl. If the water is tilted in the bowl, the refrigerator is not level and must be adjusted.

13. To level the refrigerator, first take careful notice of the direction in which the water tilts in the bowl. The side of the refrigerator nearest the *lowest* depth of the water will have to be *lowered.* The side of the refrigerator nearest the *greatest* depth of water will have to be *raised.*

NOTE: Leveling legs (leveling screws) are located in the four lower corners of the refrigerator.

14. To raise a corner of the refrigerator, turn the leveling leg out (counter-clockwise) which will lengthen it. To lower a corner, turn the leveling leg in (clockwise) which will shorten it. *(Figure 8)*

NOTE: If leveling legs are difficult to turn by hand, use a pair of pliers to grip the nut-shaped pad of the leg.

15. To level refrigerators equipped with rollers, simply place a thickness of cardboard or wood under rollers in appropriate corners to compensate for uneven floors.

FIG. 7

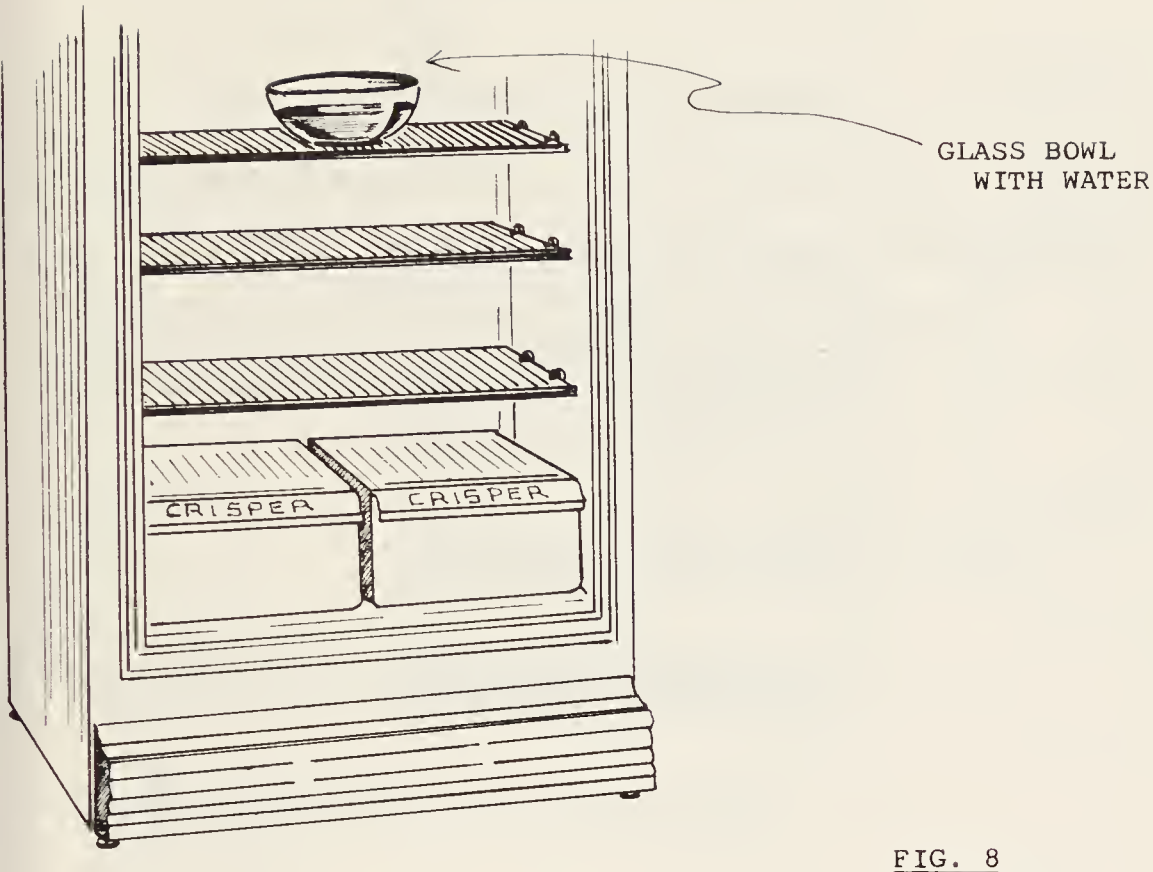
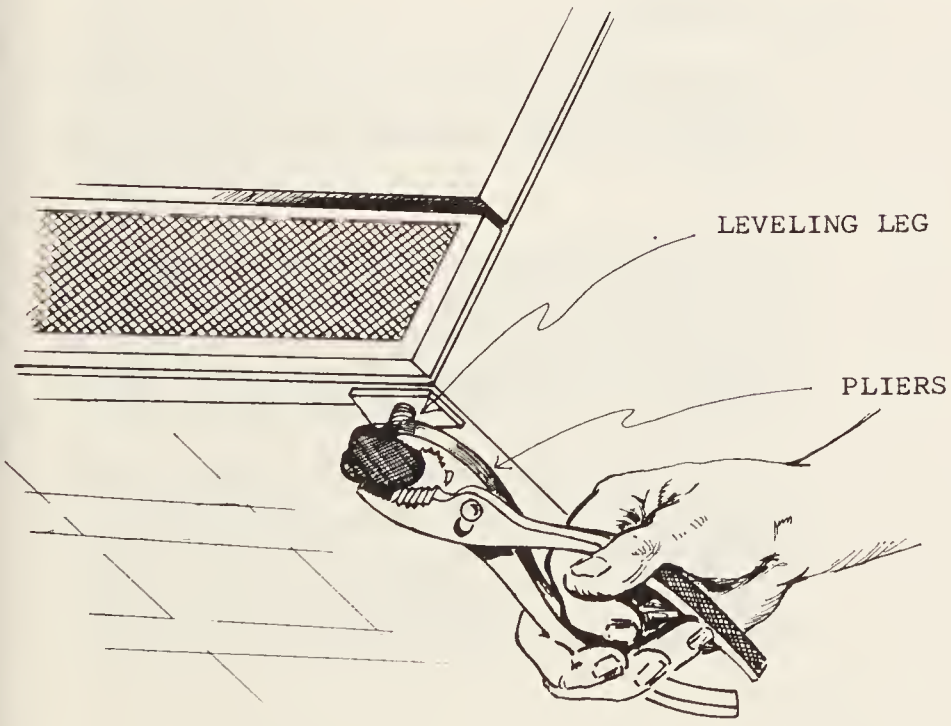


FIG. 8



Problem Solver # 16

APPLIANCE: Refrigerators and Refrigerator-Freezers

PROBLEM: **Temperature too warm at normal setting.**

EXPLANATION: When milk and other beverages are warmer to the touch and taste than they usually are, even though the refrigerator thermostat (cold control) is at its usual setting, a check of the refrigerator compartment temperature is in order.

TOOLS AND MATERIALS NEEDED:

(a) a drinking glass

(b) an indoor-outdoor thermometer (with metal back)

(c) vacuum cleaner (with small brush attachment on hose)

(d) a flashlight

SOLUTION:

1. Check the thermostat to make sure it has not been accidentally moved from its proper setting.

   NOTE: Consult owner's instruction manual which gives specific directions for thermostat settings. If the thermostat has been set correctly, then the temperature of the refrigerator compartment should be measured with a thermometer.

2. To measure the compartment temperature, insert a thermometer into a half-filled glass of water and place the glass on an upper shelf. *(Figure 1)* Close the refrigerator door and allow the glass of water to remain for thirty min-

FIG. 1

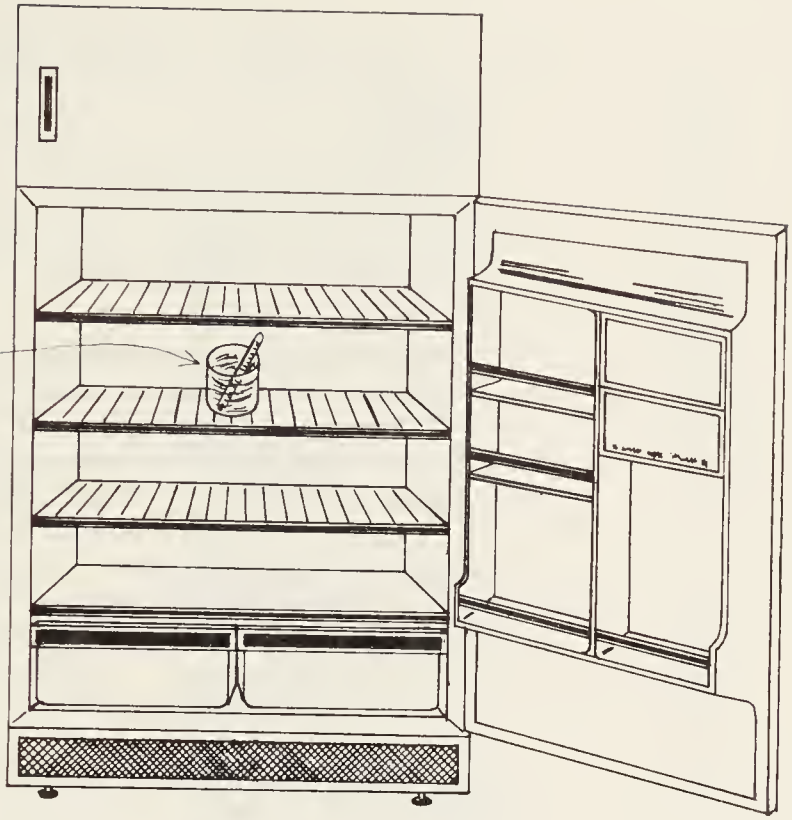
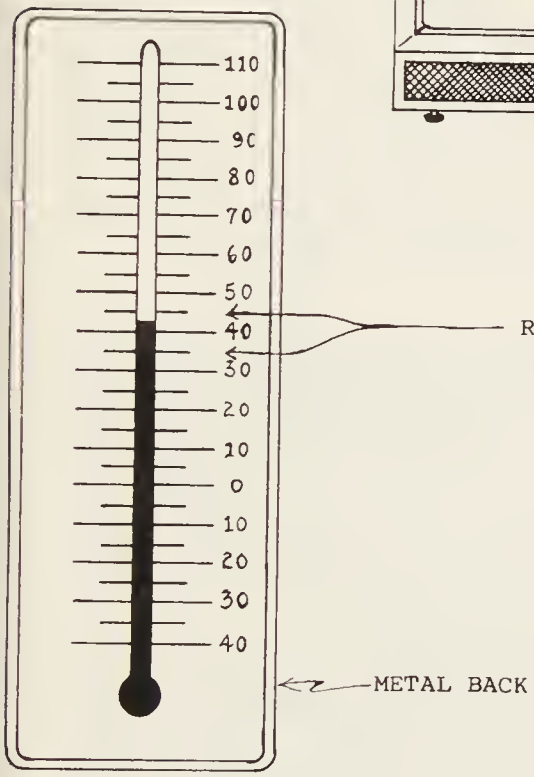

THERMOMETER IN
GLASS OF WATER

FIG. 2


THERMOMETER
110
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
REFRIGERATOR
COMPARTMENT
TEMPERATURE
RANGE
METAL BACK

utes. Remove the thermometer from the glass and quickly read the temperature.

3. The temperature should be between 35 degrees and 45 degrees F. *(Figure 2)* If the temperature is above this range, it is too high. Proceed as directed in the following steps.

SPECIAL NOTE: Two different types of systems are presently being used to cool refrigerator (and freezer) compartments. In one type, the evaporator (cooling coil) is located and can be seen in the compartment. In the second type, the evaporator is located inside the compartment wall and cannot be seen. This system uses a fan to force cold air through the compartment and is employed in "no frost" or "frost-free" refrigerators.

For this type of refrigerator, check to see that the food is not stored in a manner that might block the flow of cold air from the inlet before proceeding with the steps that follow (which may be applied to either type of system).

4. Check the condenser to see that it is being adequately ventilated by room air.

NOTE: Heat that is removed from within the refrigerator compartment (and freezer) is given up to the outside room air by the condenser. Room air must circulate freely in and around the condenser to readily absorb heat from it if the refrigerator is to operate satisfactorily. Dirt (lint-filled) or other conditions that block the condenser can reduce the cooling capacity of the refrigerator and/or freezer.

Condensers are located either along the back of the cabinet where they appear as a combination tube and wire grille *(Figure 3)* or under the refrigerator cabinet constructed with tubing and fins and resembling a car radiator in appearance. Condensers located under the cabinet are ventilated with a fan that forces air through them. *(Figure 4)*

FIG. 3

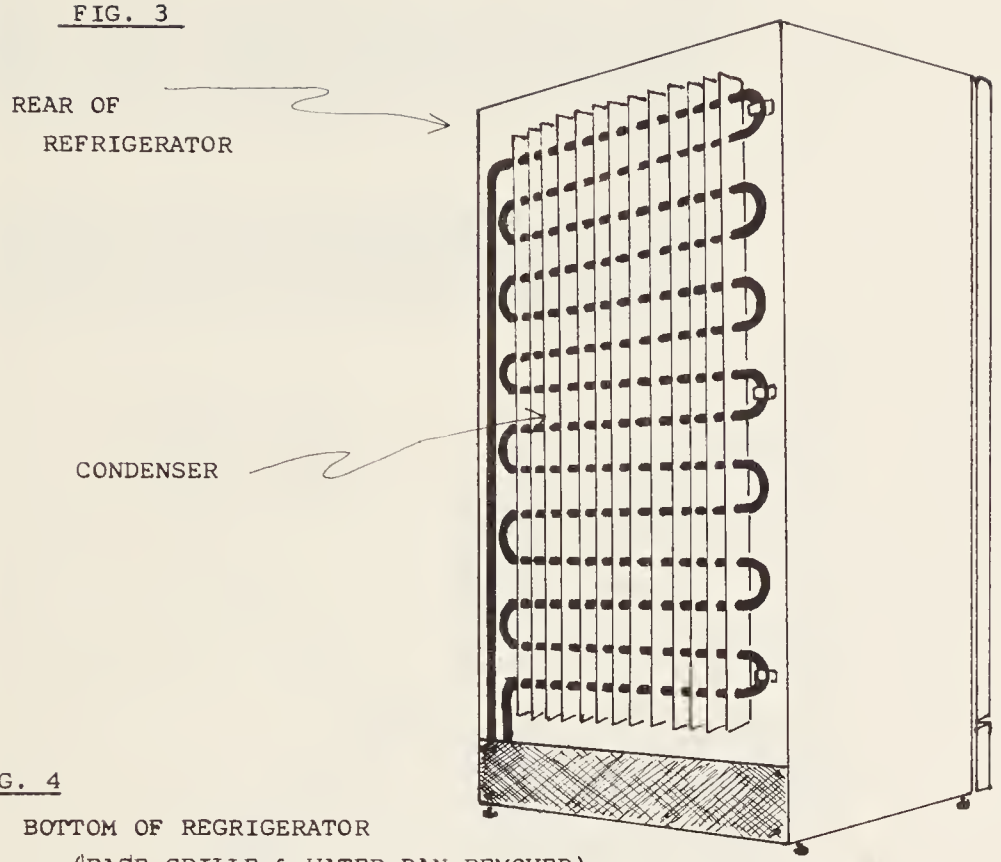
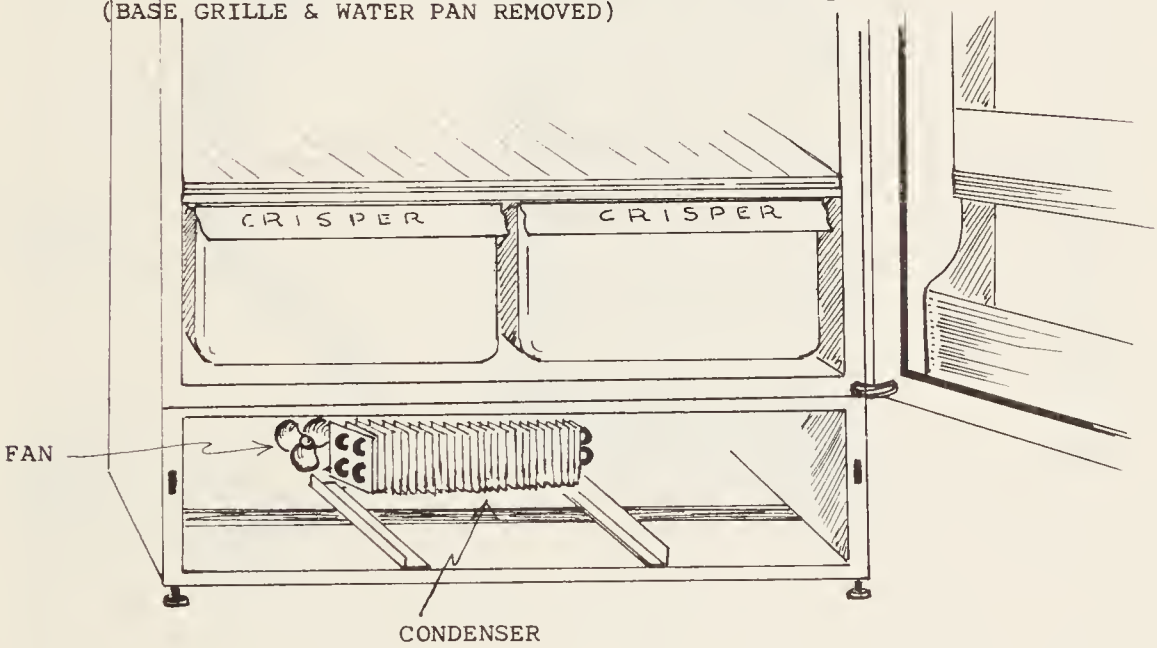


FIG. 4

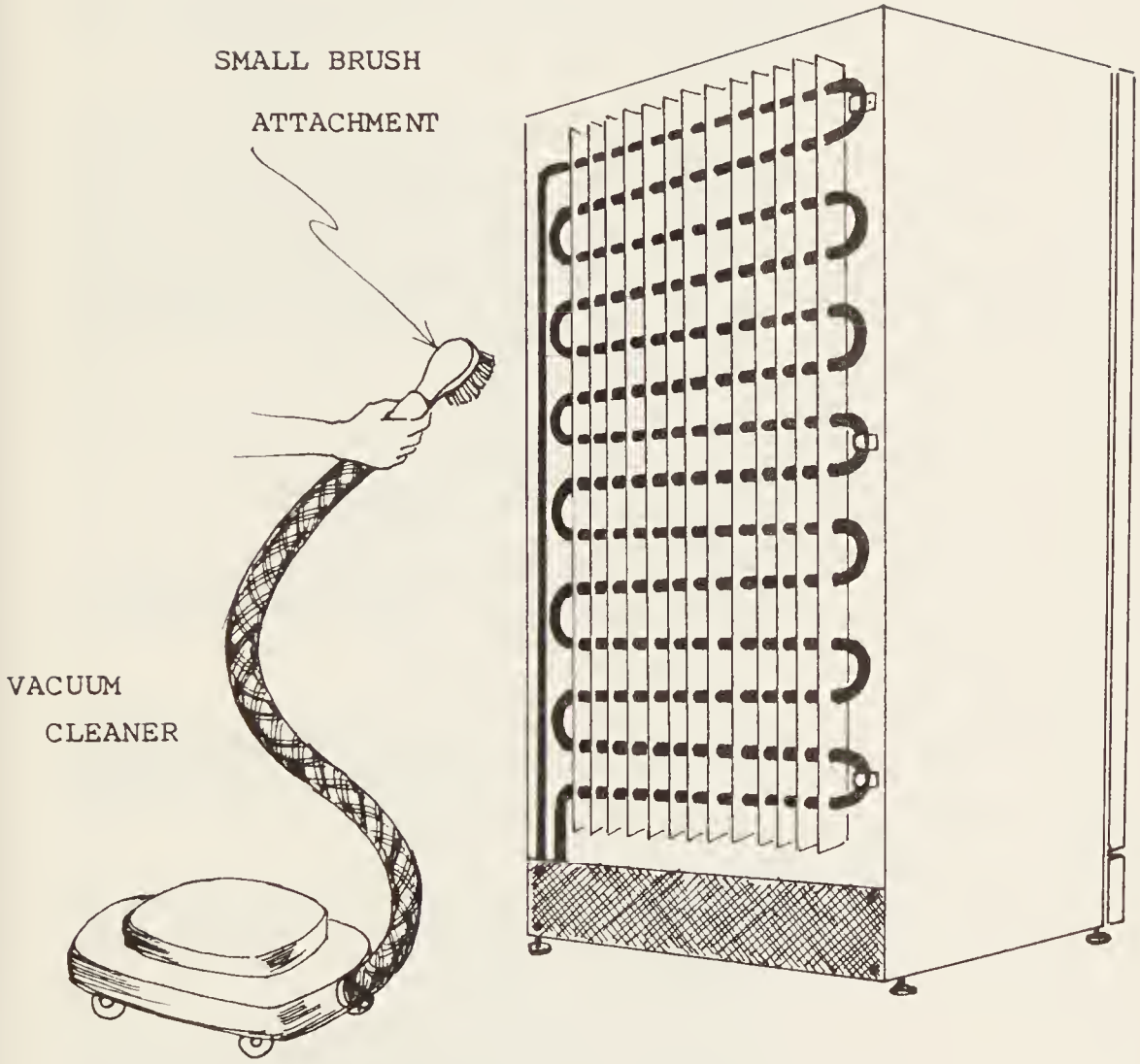
BOTTOM OF REGRIGERATOR
(BASE GRILLE & WATER PAN REMOVED)



5. Clean condensers located in the rear of refrigerator with a vacuum cleaner. Use a small brush attachment to loosen dust and dirt. *(Figure 5)*

CAUTION: Do not strike any part of the condenser with hard or sharp objects since such contact can cause damage and possibly impair the condenser's operation.

FIG. 5



6. To clean condensers located under the cabinet, first remove the base grille (kick plate) then pull the defrost water pan completely out to expose the condenser. *(Figures 6 and 7)*

   NOTE: Consult owner's manual (instruction booklet) for specific instructions for removing base grille and defrost water pan.

7. Use a flashlight to inspect the condenser. *(Figure 8)*

   NOTE AND CAUTION: Take care not to contact fan blades (used to force air through this type of condenser). Make sure, however, that the fan runs when the refrigerator is in operation. If the fan does not operate, the services of a qualified appliance technician will be needed to check and correct the fan problem. If the fan operates, proceed to clean the condenser.

8. Use a vacuum cleaner with a small brush attachment to clean the condenser.

9. After cleaning the condenser (either type) retest the temperature with a thermometer as outlined in steps 2 and 3.

   SPECIAL NOTE: To keep a refrigerator operating at peak performance, vacuum clean the condenser at least once every six months (more often if refrigerator is located in a dusty area).

   Leave enough space between food stored on shelves to allow the cold air to circulate freely throughout the cabinet.

   Follow the manufacturer's instructions for locating the refrigerator properly to avoid blocking the free flow of room air to the condenser.

FIG. 6

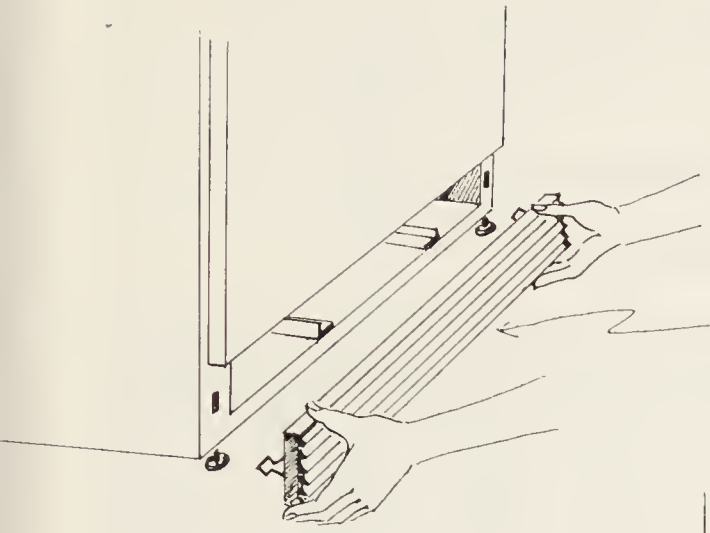


FIG. 7

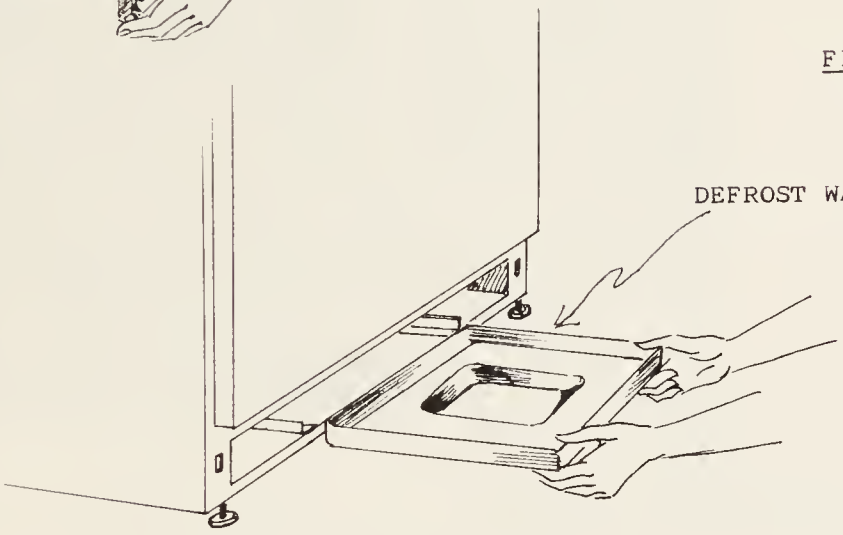
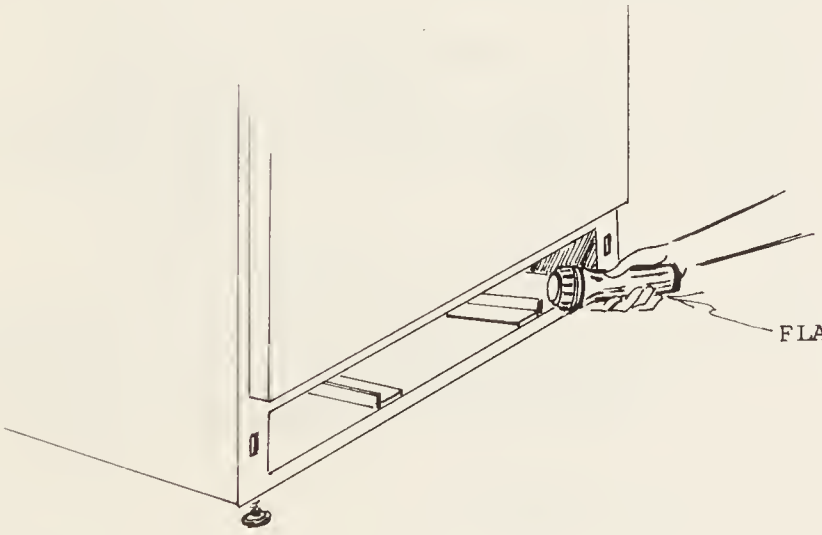


FIG. 8



Problem Solver #17

APPLIANCE: Room Air Conditioners

PROBLEM: **Water leaks into room.**

EXPLANATION: There are two major causes for this complaint. It usually occurs when the air conditioner, instead of resting level or perhaps even slanted slightly to the outside, is tilted forward towards the room. Consequently, the condensate water (moisture removed from the room air) will flow to the front of the air conditioner and spill over into the room instead of flowing to the rear of the machine where it can be disposed of properly. A less frequent occurrence can be traced to cold metal components (such as the basepan) that extend into the room. A significant amount of condensate water can accumulate when the moisture in the room air contacts the cold surfaces of these cooled components.

TOOLS AND MATERIALS NEEDED:

(a) rags or paper towels

(b) a sheet of foam rubber (or foam plastic) ¼ inch thick

(c) rubber cement (tube or bottle)

(d) 3 wood wedges (sizes to be determined by the space between the bottom of the air conditioner and the window sill—see text)

(e) a hammer

FIG. 1

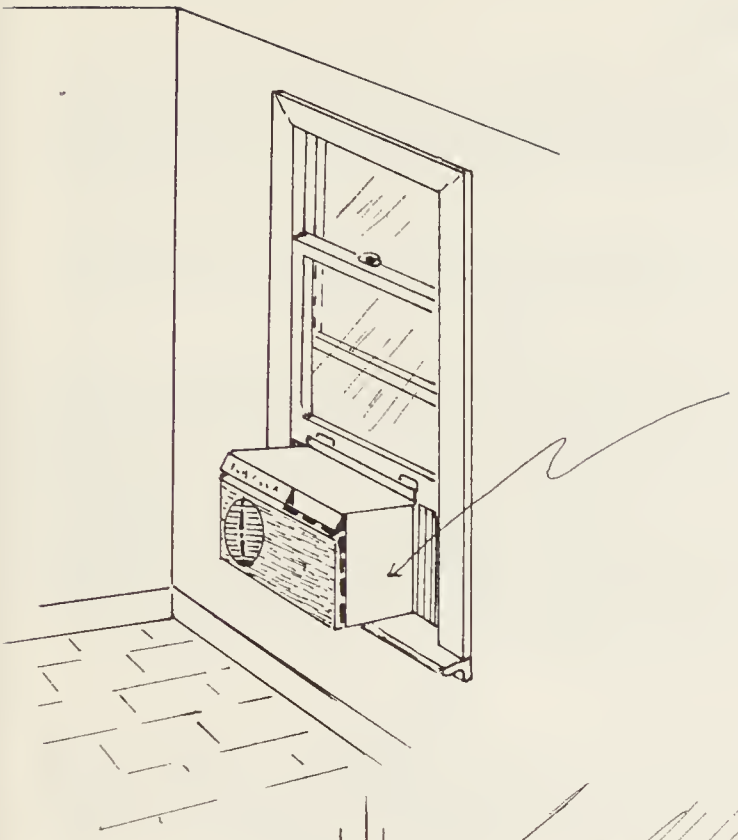
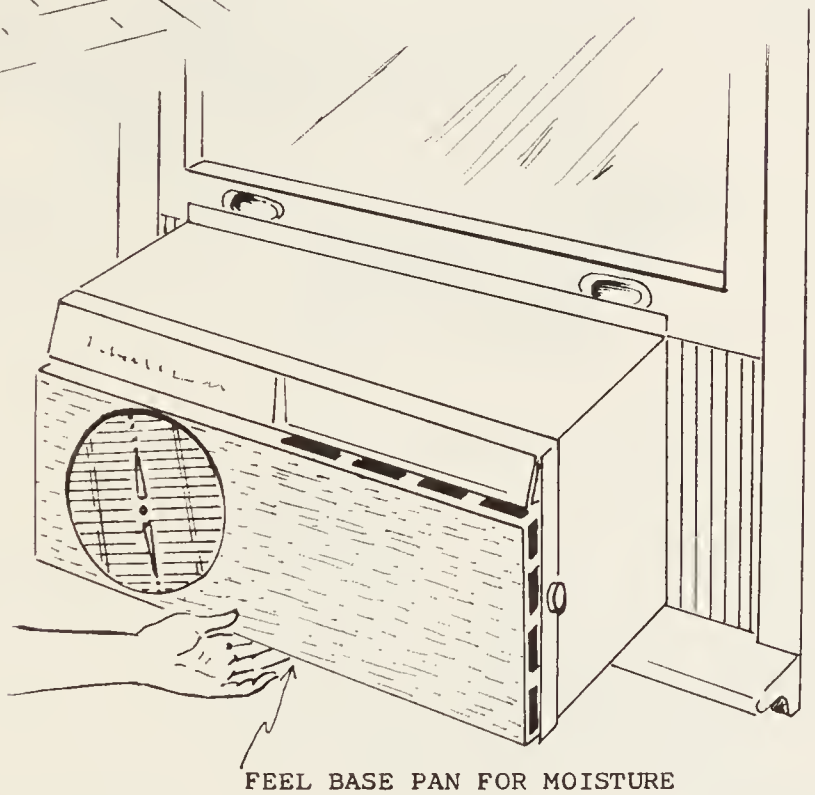

FRONT PORTION OF
ROOM AIR CONDITIONER
EXTENDS INTO ROOM

FIG. 2


FEEL BASE PAN FOR MOISTURE

SOLUTION:

1. If the air conditioner is installed so that a portion of it extends into the room *(Figure 1),* see if water is condensing on its bottom surface.

2. Place hand on base pan under air conditioner. *(Figure 2)* If it is wet, it must be insulated.

   NOTE: Insulation will prevent the humid room air from coming into contact with the cold base pan and therefore prevent condensation.

3. To insulate the base pan, first shut off the air conditioner and allow the base pan to become warmer. Then dry the base pan with a rag or paper towel.

4. Cut to size a one-quarter-inch-thick (or thicker) piece of foam rubber or foam plastic to cover the area of the base pan that extends into the room. *(Figure 3)*

5. Cement the foam rubber (or plastic foam) to the base pan with rubber cement to complete the procedure for preventing external condensation. *(Figure 4)*

FIG. 3

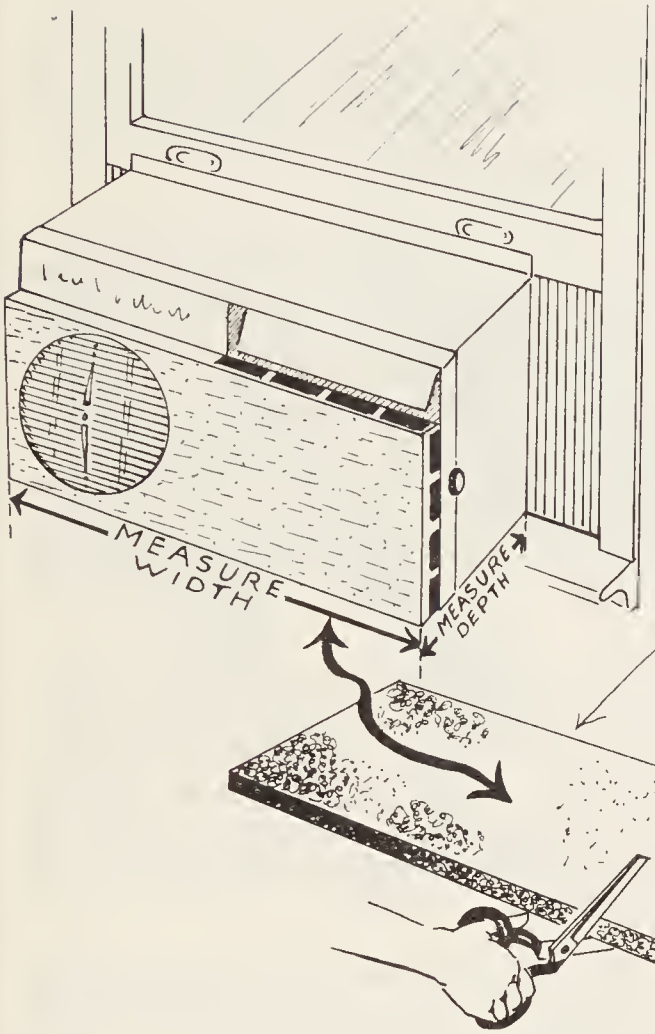
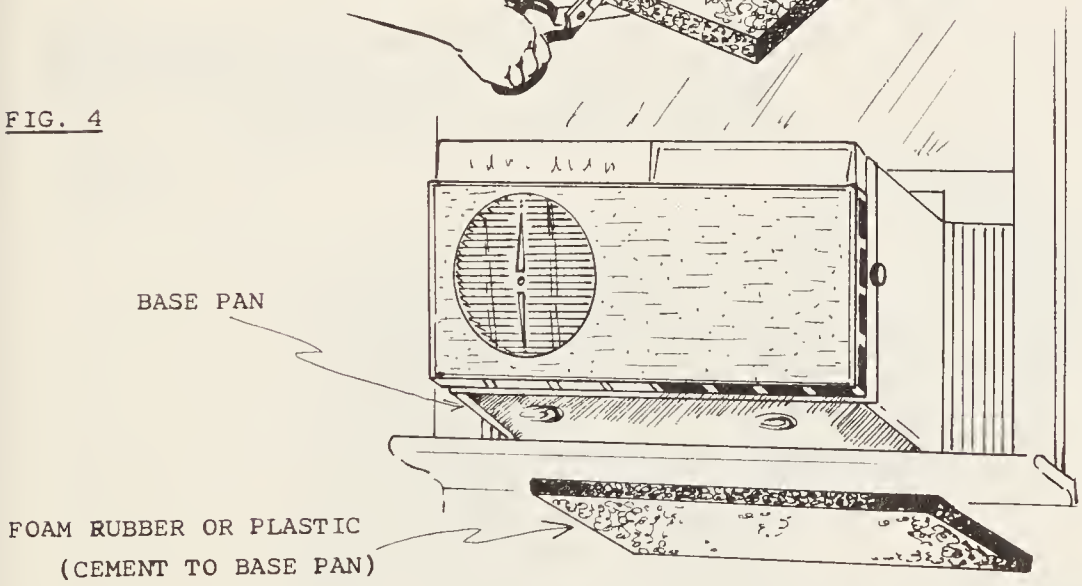

MEASURE WIDTH
MEASURE DEPTH
SHEET OF FOAM
RUBBER OR FOAM PLASTIC
(CUT TO SAME SIZE
AS BASE PAN)

FIG. 4


BASE PAN
FOAM RUBBER OR PLASTIC
(CEMENT TO BASE PAN)

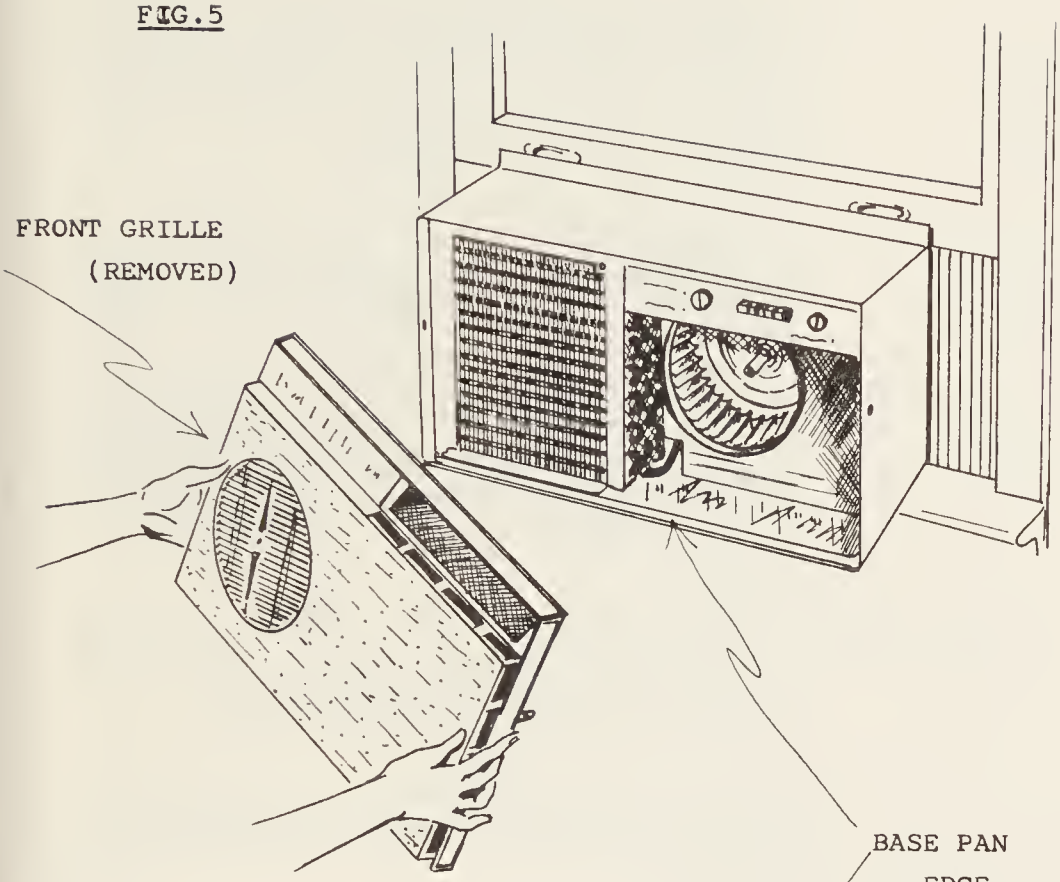
6. To test for leaks produced when condensate water spills out of the base pan into the room because the air conditioner is improperly balanced, first remove the front grille. *(Figure 5)*

   NOTE: Smaller, portable type room air conditioners may not have removable front grilles. These models are usually advertised and sold as units that can be installed by the customer since no special tools or materials are needed. When a water leak is experienced with any of these types of room air conditioner, the problem is simply overcome by rearranging the unit in the window so that it tilts slightly down towards the outside of the building. This allows the condensate water inside the base pan to flow toward the outside where it is readily dissipated.

   Larger capacity units, installed by appliance technicians, are provided with removable front grilles. For these units, follow the same procedure for removing the grille as is done to clean the air filter. Refer to manufacturer's instruction booklet (if necessary) which gives specific instructions for the particular model.

7. With the front grille removed, check along the edge of the base pan to locate point where water is spilling over. *(Figure 6)*

FIG.5



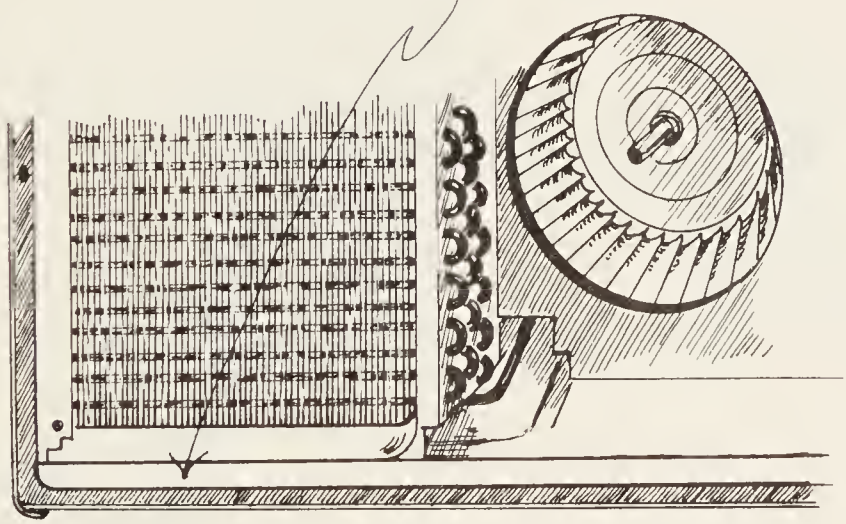


FIG. 6

8. If water is spilling over from the righthand corner, place a single wood wedge under the extreme righthand corner of the base pan (between base pan and window sill) and drive it in with a hammer. *(Figure 7)*

   NOTE: The height of the wedge should be two inches higher than the measured space between the bottom of the air conditioner and the window sill.

9. If water is spilling over the lefthand corner of the base pan, drive a single wood wedge under the extreme lefthand corner of the base pan. *(Figure 8)*

10. If the condensate water is spilling over the center of the base pan, drive a wood wedge under both corners of the base pan.

11. Replace the front grille after wedges have been installed and water stops spilling over base pan.

    NOTE: The wood wedges should raise the front of the air conditioner enough to allow the condensate water to flow toward the outside of the building. If, however, the wedges fail to stop the water from spilling into the room, then the services of a qualified appliance technician will be needed to make a major installation adjustment.

FIG. 7

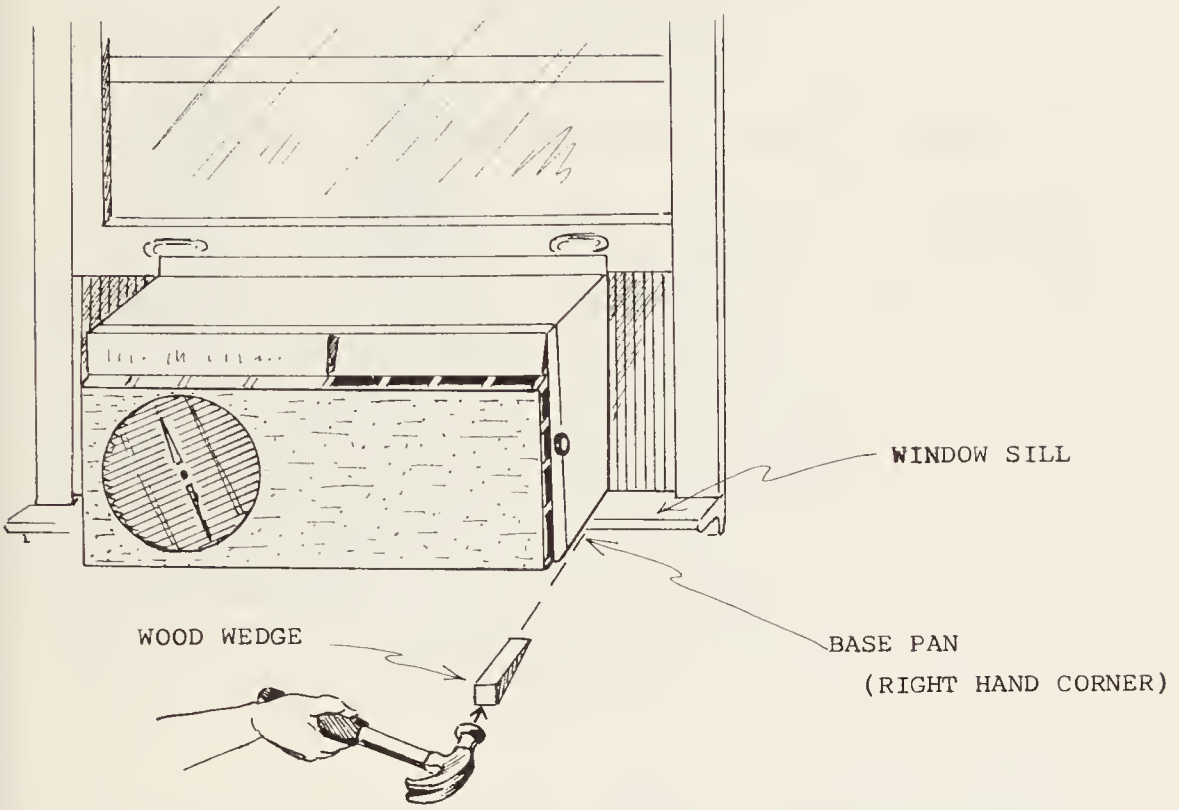
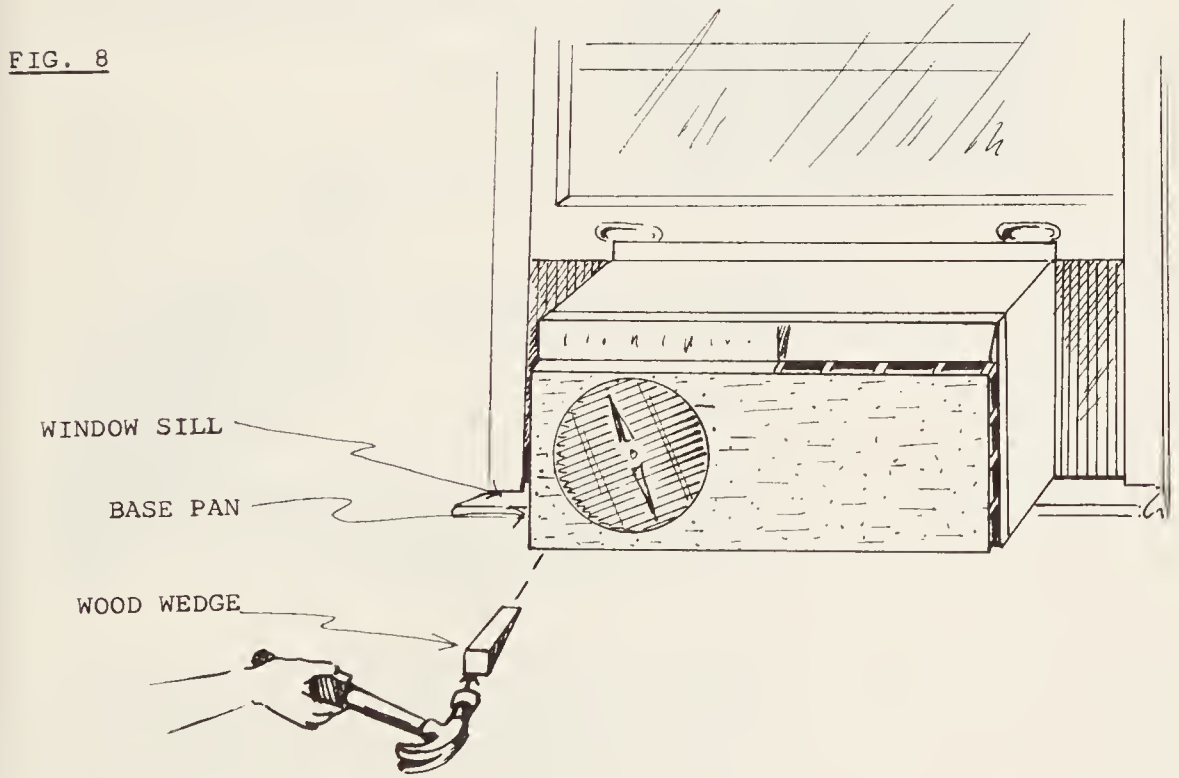

WINDOW SILL
WOOD WEDGE
BASE PAN
(RIGHT HAND CORNER)

FIG. 8


WINDOW SILL
BASE PAN
WOOD WEDGE

Problem Solver # 18

APPLIANCE: Room Air Conditioners

PROBLEM: **Ice forms behind the front grille.**

EXPLANATION: Ice (frost) can form over the entire surface of the evaporator (cooling coils) located behind the front plastic grille if the airflow system is restricted. Another noticeable symptom may be a reduction in the force of the air blowing into the room (air from the outlet grille can only be felt when standing close to the air conditioner). When restricted, the air will feel much colder than usual, and in extreme cases, a white mist can be seen leaving the air outlet of the front grille.

TOOLS AND MATERIALS NEEDED:

(a) a universal type replacement air filter

(b) a flatblade screwdriver

(c) a heavy duty scissors (poultry shears will also do)

(d) a vacuum cleaner with venetian blind hose attachment

(e) a bottle of mineral oil

SOLUTION:

1. Make sure power to the room air conditioner has been removed. Shut unit "off" or remove line cord from wall outlet.

2. Locate, remove, and inspect the air filter to see if it is clogged with dust. See *Figures 1, 2, and 3* which illustrate where air filters are located in various types of room air conditioners.

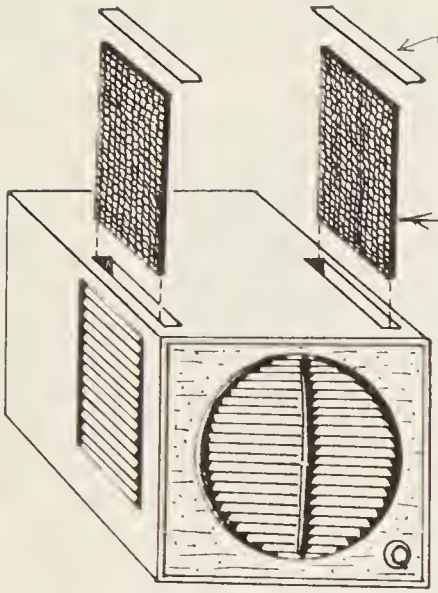
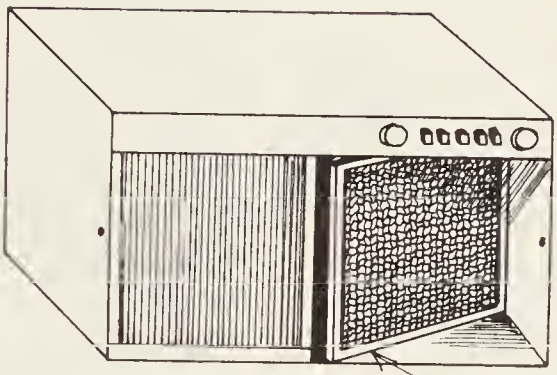


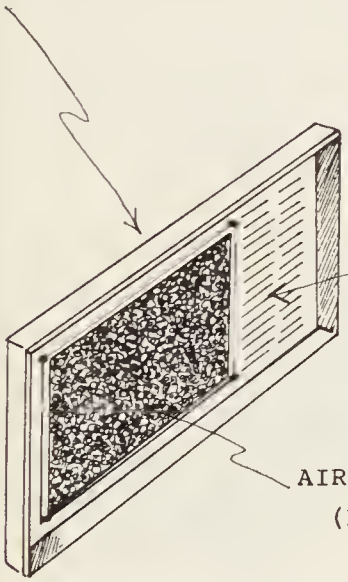
FIG. 1

FIG. 2



SHOWN WITH AIR FILTER (FRONT PLASTIC GRILLE REMOVED)

FIG. 3



3. The air filter is clogged if dust can be seen on one of its sides or if little or no light passes through the filter when it is held up to a source of light. *(Figure 4)*

   SPECIAL NOTE: Neglecting to clean or replace the air filter is the most frequent cause of an airflow restriction. The purpose of all air filters is to clean the air of dust and other foreign airborne particles. Actually, there are two main groups of air filters in use—the disposable types and the permanent types. The disposable type (used in older models) is constructed of fine interwoven fibers that cannot be successfully cleaned. These are simply replaced with new ones when they become clogged.

   The permanent types are constructed of either aluminum wire mesh or a sponge-like plastic material. Both may be washed with soap and water and reused. The aluminum mesh type, however, must be coated with a thin film of oil to be effective. Dust and other airborne particles are trapped in the coating of oil.

4. Clean light accumulations of dust from permanent plastic sponge type filters with vacuum cleaner. *(Figure 5)* If filter is impregnated with dirt, wash filter by soaking in detergent and water. Rinse under faucet and allow to dry before replacing it.

5. Clean aluminum mesh type air filters by soaking them in liquid detergent and hot water. Rinse under faucet. When dry, coat the filter with a commercial oil (available in spray cans) or with mineral oil (applied with the palm of the hand) before replacing it in the air conditioner. *(Figure 6)*

LIGHT SOURCE

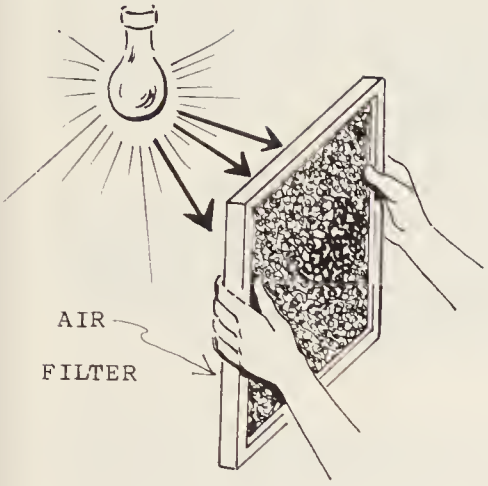


FIG. 4

FIG. 5

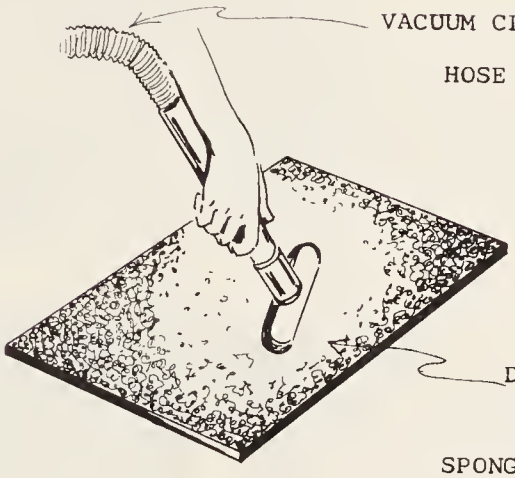
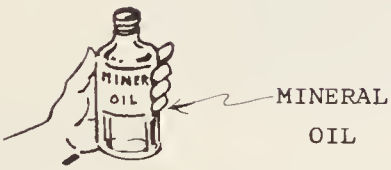
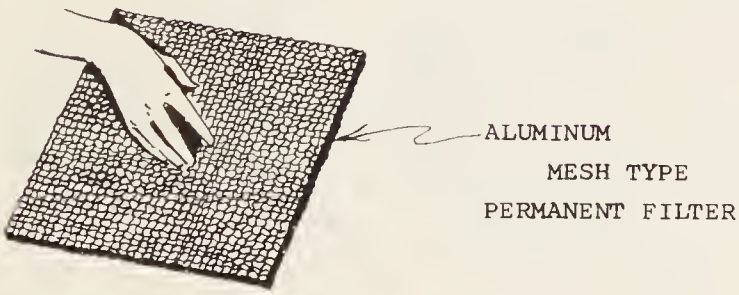


FIG. 6





NOTE: Disposable type filters may be replaced with aluminum mesh type filters. Aluminum mesh air filters are purchased in standard sizes that are larger than required by most room air conditioners. They must, therefore, be cut to the exact size of the air filter being replaced.

6. To trim aluminum mesh filters to correct size, place the old filter over the aluminum filter and cut the aluminum filter to the exact dimensions of the old filter. *(Figure 7)*

SPECIAL NOTE: New aluminum air filters come precoated with oil. There is no need, therefore, to oil them for their first use. All air filters (regardless of type used) should be inspected and cleaned or replaced frequently (at least once a month) during continuous operation and more often when the air conditioner is operated in exceptionally dusty rooms (such as bedrooms, laundry rooms, and kitchens) which contain a great deal of airborne lint.

7. Locate and inspect the "squirrel cage" type of evaporator fan for dirt. *(Figure 8)*

FIG. 7

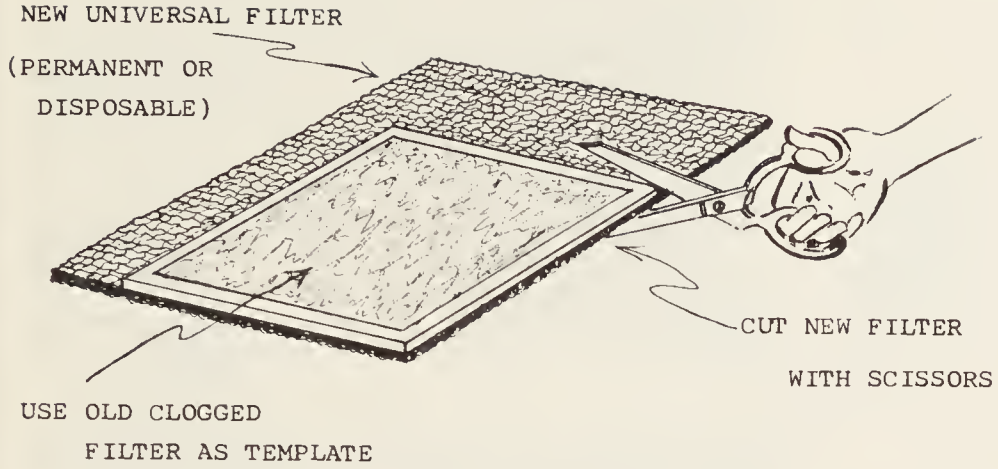
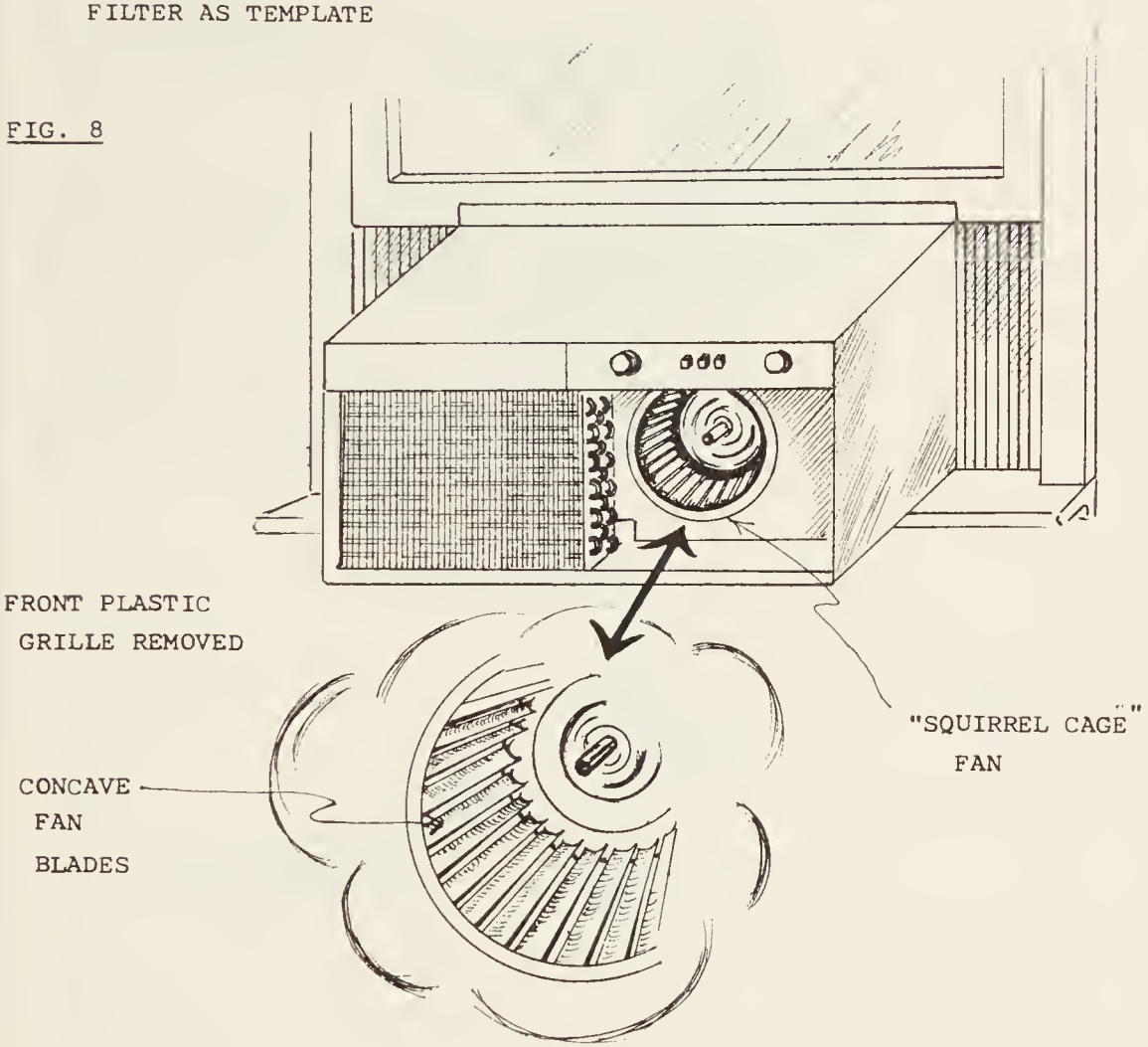

NEW UNIVERSAL FILTER
(PERMANENT OR
DISPOSABLE)
CUT NEW FILTER
WITH SCISSORS
USE OLD CLOGGED
FILTER AS TEMPLATE

FIG. 8


FRONT PLASTIC
GRILLE REMOVED
"SQUIRREL CAGE"
FAN
CONCAVE
FAN
BLADES

NOTE: The evaporator fan is responsible for circulating the room air through the filter where it is cleaned, and then through the evaporator where it is cooled and dehumidified. Should the little blades of the fan become dirty, the air flow will become greatly reduced. The construction of some room air conditioners does not allow the front plastic grille to be removed to reach the fan blades. To clean the fan blades of this type unit, the machine must be removed from the window and the entire cabinet removed to expose the fan blades. *(Figure 9)*

8. Clean the fan by scraping out caked-on dust or dirt with a screwdriver. Vacuum loosened dirt with venetian blind accessory attachment on vacuum cleaner. *(Figure 10)*

SPECIAL NOTE: When ice (frost) forms on a small portion of the evaporator (cooling coils), an entirely different problem is indicated. In such instances, and especially when all of the above cleaning service has been performed, the problem is more often due to a loss of refrigerant (gas) from the sealed unit. This problem must be referred to a qualified appliance technician for proper repair.

FIG. 9

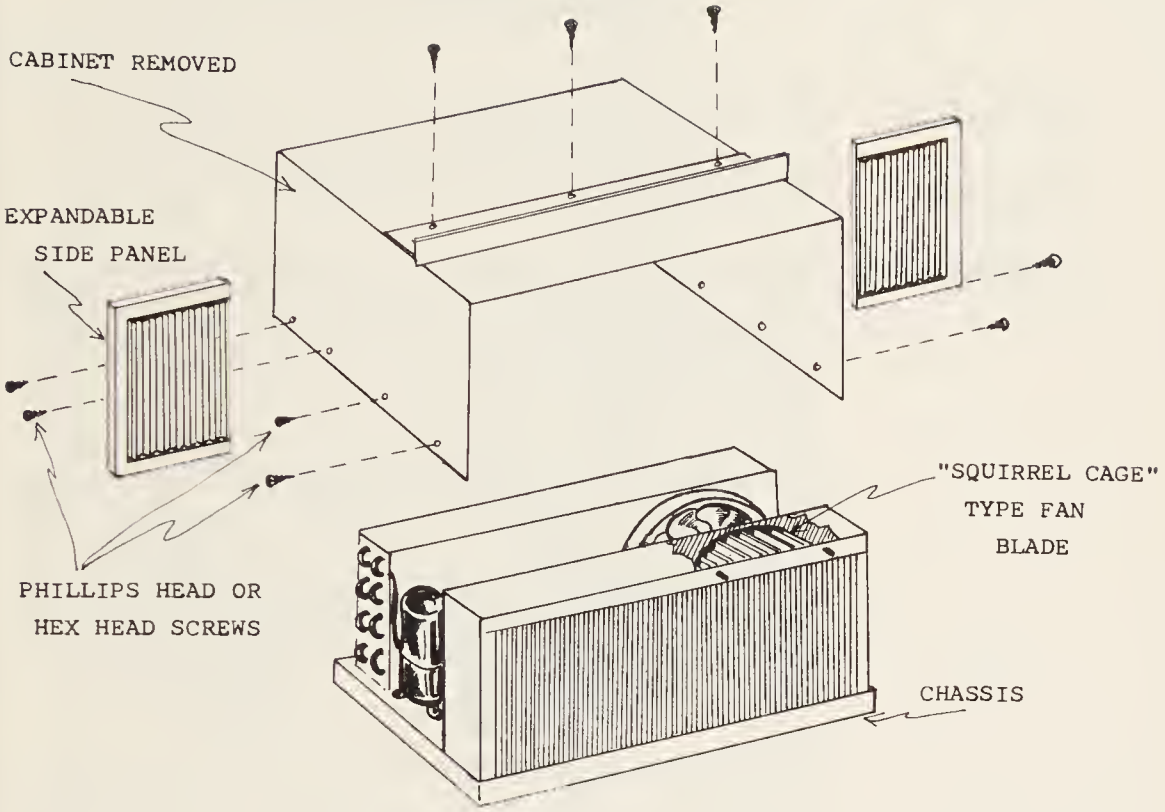
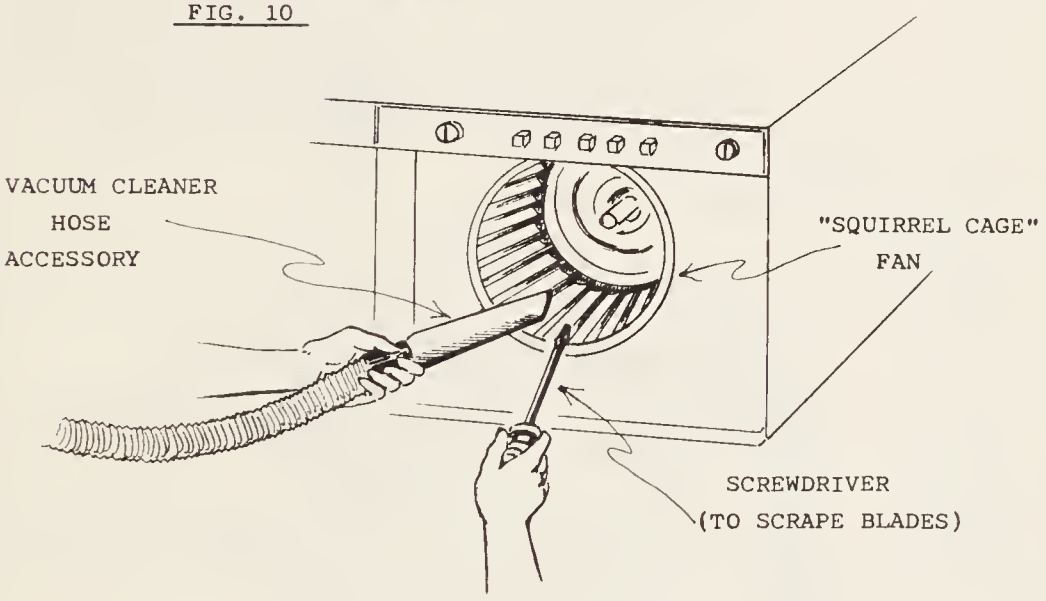

CABINET REMOVED
EXPANDABLE
SIDE PANEL
PHILLIPS HEAD OR
HEX HEAD SCREWS
"SQUIRREL CAGE"
TYPE FAN
BLADE
CHASSIS

FIG. 10


VACUUM CLEANER
HOSE
ACCESSORY
"SQUIRREL CAGE"
FAN
SCREWDRIVER
(TO SCRAPE BLADES)

Problem Solver # 19

APPLIANCE: Room Air Conditioners

PROBLEM: **Excessive noise during operation.**

EXPLANATION: Many factors contribute toward the overall noise level produced by a room air conditioner. Normally, only two sections of a room air conditioner should produce audible sound—the motor-compressor and the motor-fan assemblies. It is generally the fan that produces most of the audible sound by forcing air at high speed through the front plastic grille outlet. The level of this noise will vary in pitch and intensity according to the design of the front plastic grille outlet and the speed of the fan.

The noise (vibration) produced by the motor-compressor is usually negligible since it is situated toward the rear of the air conditioner which is outside the room. Under certain conditions, however, its normal operating vibrations can be transmitted and even amplified to a disturbing level.

TOOLS AND MATERIALS NEEDED:

(a) a small wood or rubber wedge

(b) a phillips screwdriver (medium)

(c) a nutdriver (¼ inch)

(d) a roll of cloth (mystic) tape

(e) a roll of cellophane tape

(f) a drop cloth or an old piece of rug

FIG. 1

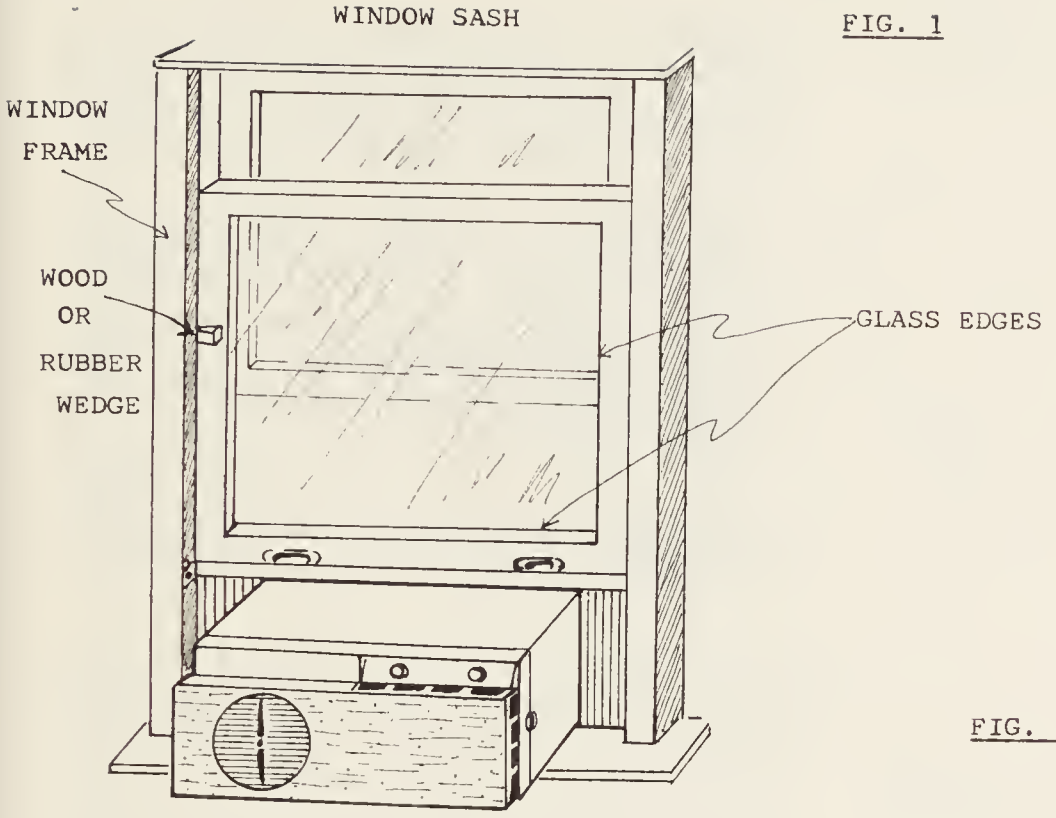
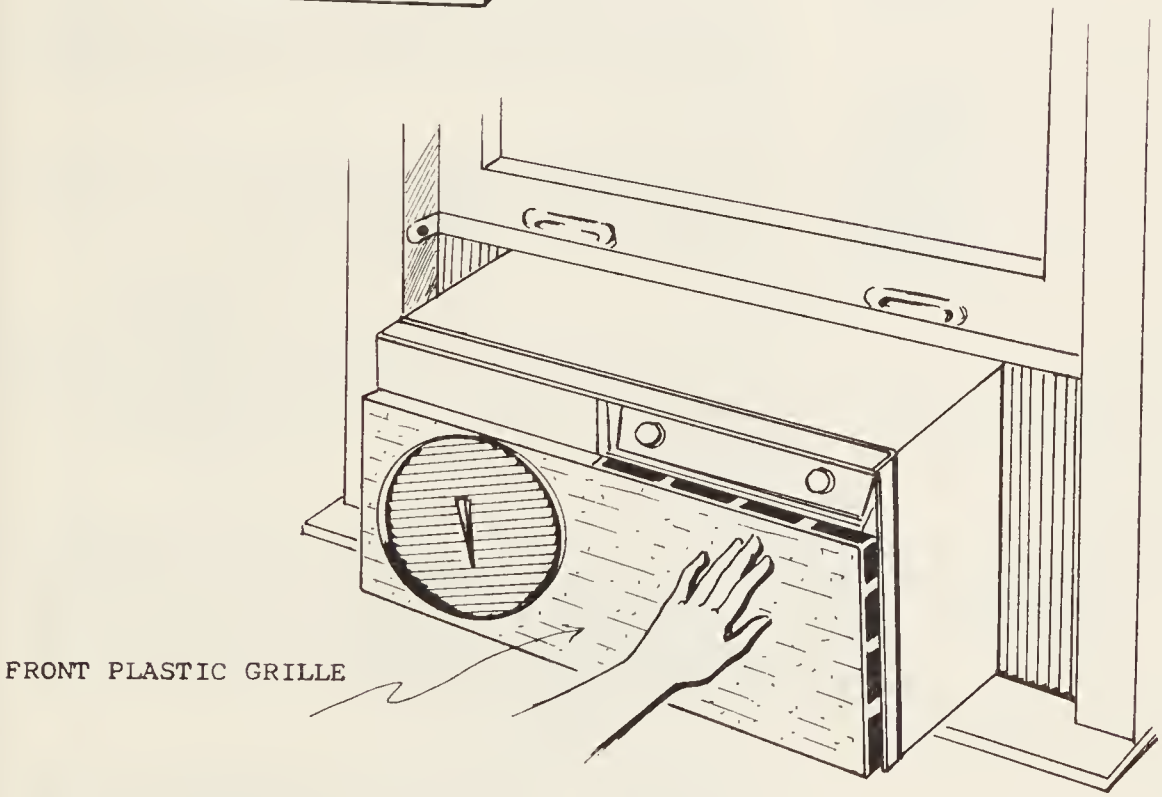

WINDOW SASH
WINDOW FRAME
WOOD OR RUBBER WEDGE
GLASS EDGES

FIG. 2


FRONT PLASTIC GRILLE

SOLUTION:

1. Operate room air conditioner and try to identify type of noise (rattle, tapping, rushing air, etc.) If rattling noise is heard, check the window in which the air conditioner is installed.

2. To locate window rattles, press along upper and lower window sashes until noise stops. If window sash is loose in window frame, insert a small wood or rubber wedge between window sash and window frame to stop the rattle. *(Figure 1)*

3. If rattle stops when glass pane is pressed, glass is loose and should be secured.

4. To correct this condition temporarily, fasten glass with strips of cellophane tape along edges of glass to stop the rattle. *(Figure 1)* A more permanent repair should be made with glazing compound whenever it becomes necessary to remove the air conditioner from the window.

   NOTE: If rattle is not being caused by loose window components, then the air conditioner should be checked for loose or broken parts.

5. Press hand along front grille to try to stop noise. *(Figure 2)* If vibrating noise stops when grille is held, check the front grille to see that it is properly attached to the cabinet.

6. If the noise cannot be eliminated by resetting the front grille, fasten it to the cabinet by placing strips of colored cloth adhesive tape (to match the cabinet) along the edges of the air conditioner. *(Figure 3)*

7. If rattling or tapping type noises seem to originate from within the air conditioner, then the chassis must be removed from the cabinet for further inspection.

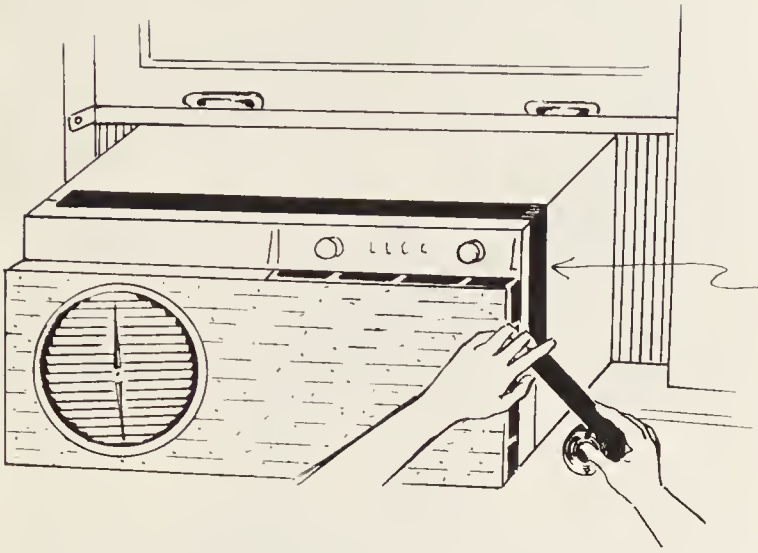
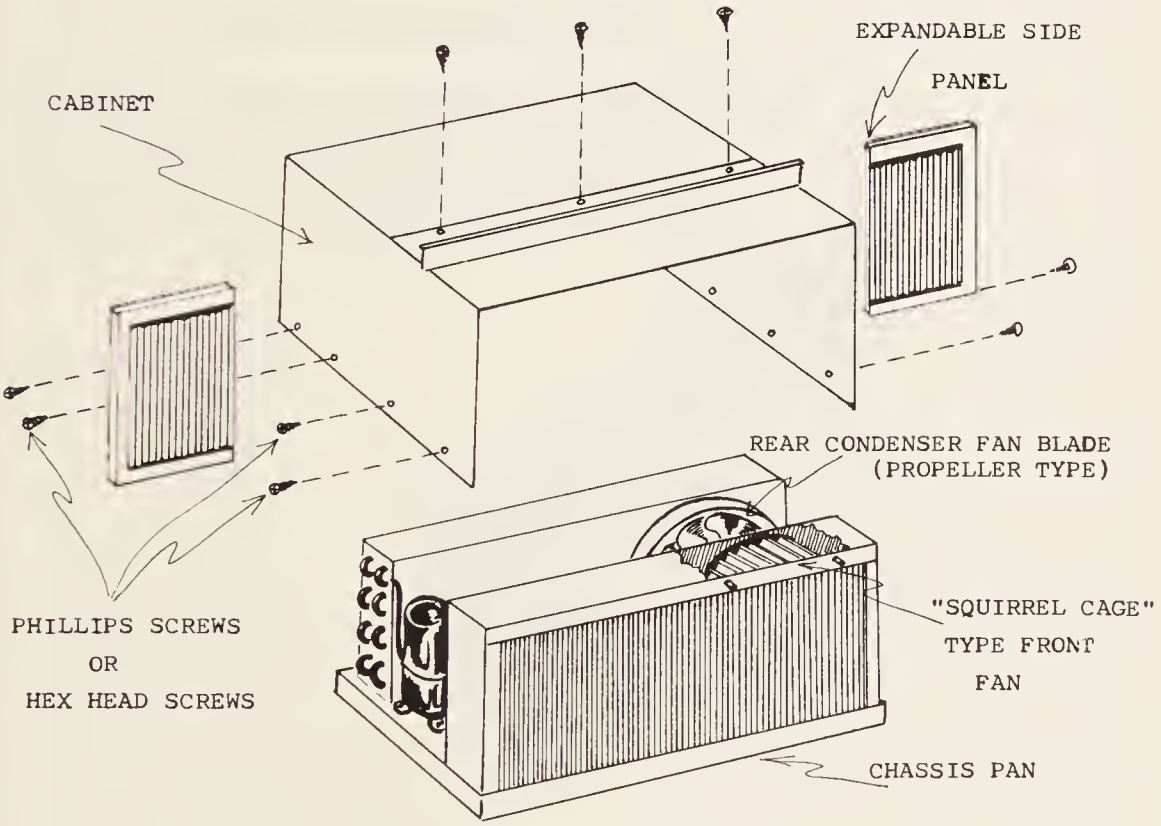


FIG. 3

FIG. 4 PORTABLE TYPE WITH CABINET REMOVED



NOTE: The construction of some room air conditioners allows the chassis, upon which all of the components are mounted, to slide out from the cabinet after only taking off the front plastic grille. In smaller, more portable type units, the entire machine must first be removed from the window and then the cabinet must be removed to expose the inner components. The cabinets of these units are removed by first removing all of the screws (phillips head or hexagon head) from around the bottom and sides of the cabinet. *(Figure 4)*

8. To inspect units that slide out from cabinet, remove front grille and lay it safely aside. *(Figure 5)*

CAUTIONS:

1. Remove plug from wall outlet.
2. Get someone to help pull chassis from cabinet.
3. Place dropcloth or old rug under window to prevent soiling floor covering.

9. Grasp chassis pan and tug sharply. *(Figure 6)* Put equal strain on both sides of chassis pan to prevent it from twisting and wedging itself against the cabinet. Place chassis on drop cloth.

FIG. 5

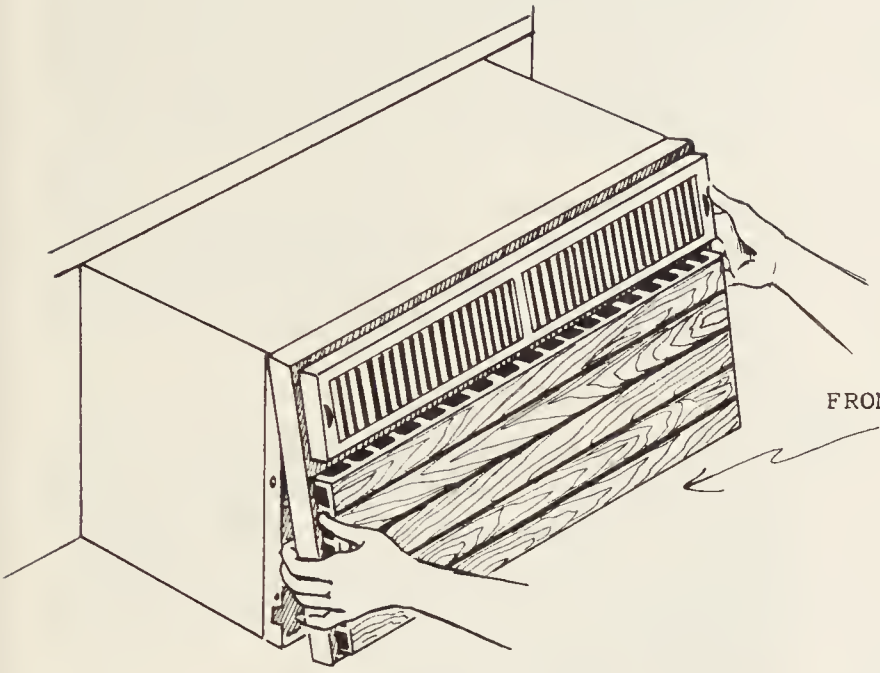
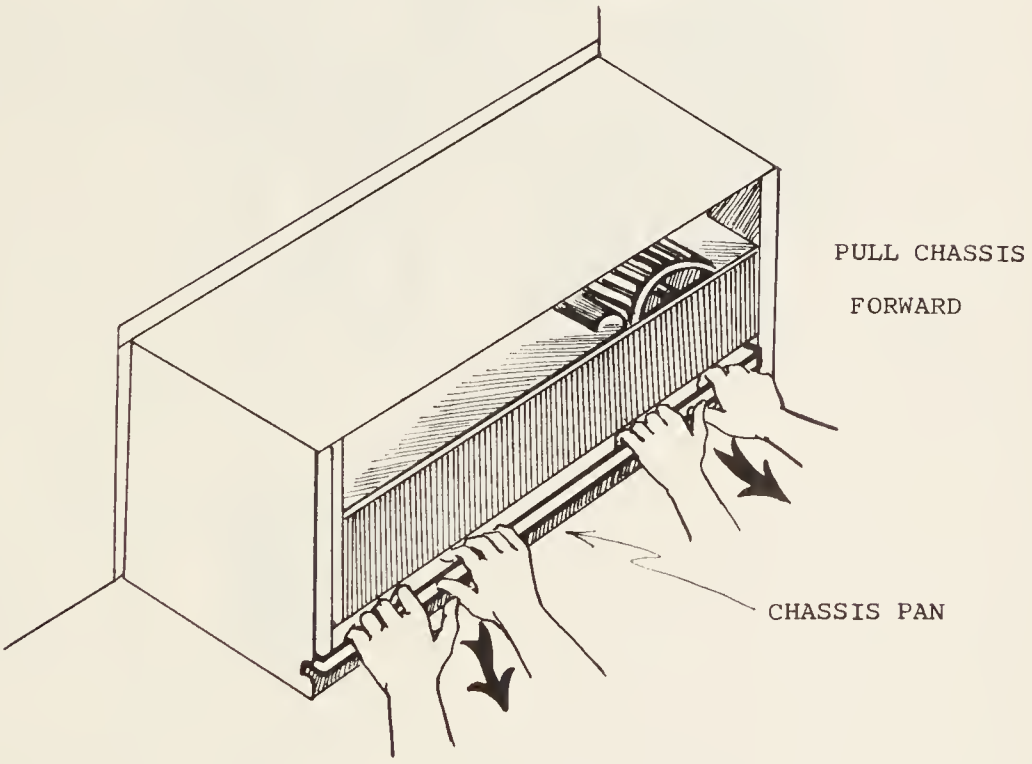


FIG. 6



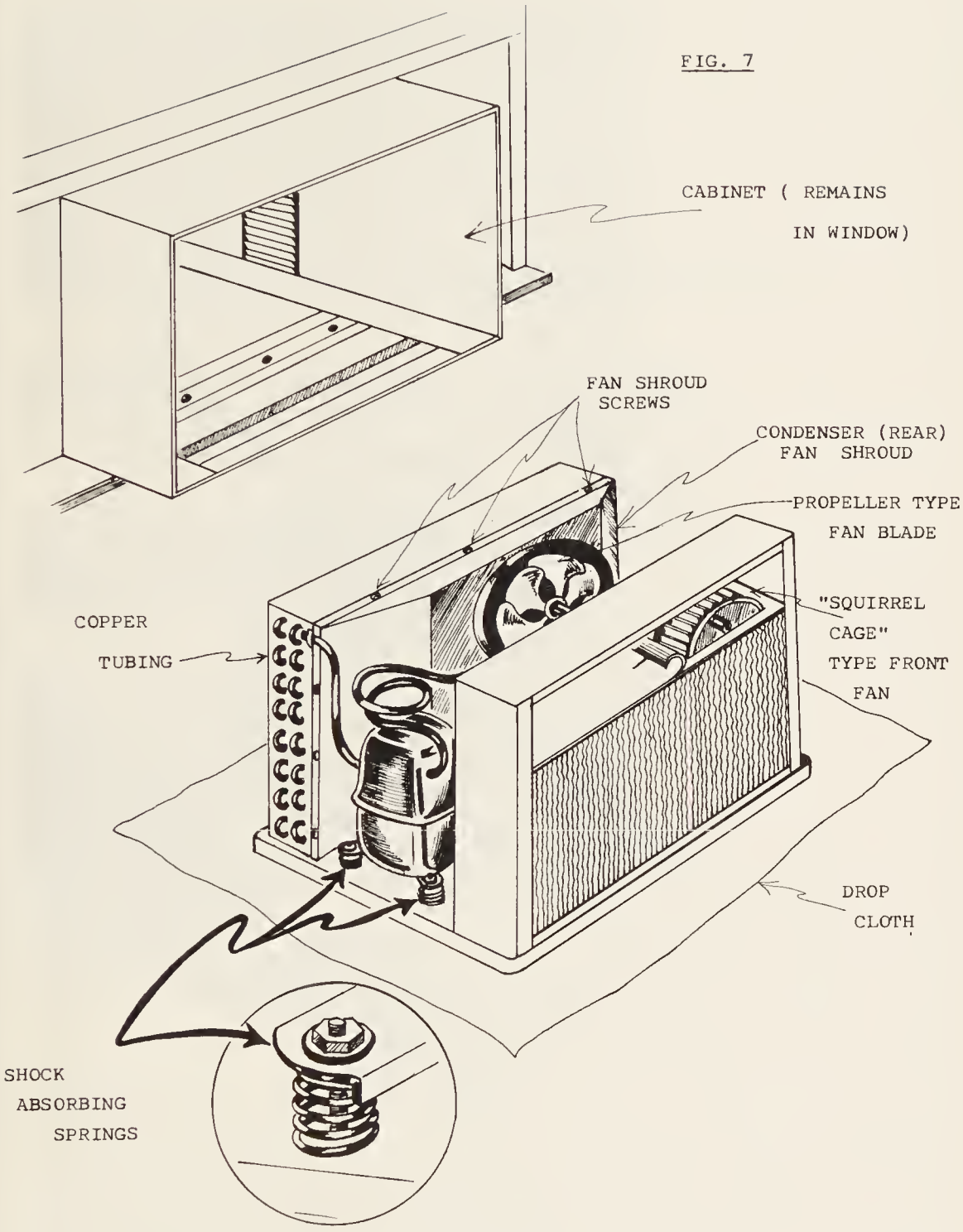
10. Spin the fan blades by hand. If tapping noise is heard, fan blades (front "squirrel cage" type or rear propeller type) are hitting the surrounding shroud. Carefully inspect all blades to locate exact point of contact. *(Figure 7)*

11. Adjust fan blades or fan shroud to provide proper clearance. Loosen fan shroud screws and readjust it or bend fan blades slightly forward or rearward until clearance is obtained. *(Figure 8)*

12. If fan blades were not the cause of tapping noise (as tested for above), then inspect the coils of copper tubing to see that there is enough clearance between them so that they do not tap against each other when the air conditioner operates. *(Figure 7)*

13. Inspect copper tubing carefully along its entire length. Slowly bend tubing coils away from each other until there is at least one inch of clearance.

FIG. 7


CABINET (REMAINS IN WINDOW)
FAN SHROUD SCREWS
CONDENSER (REAR) FAN SHROUD
PROPELLER TYPE FAN BLADE
"SQUIRREL CAGE" TYPE FRONT FAN
COPPER TUBING
DROP CLOTH
SHOCK ABSORBING SPRINGS

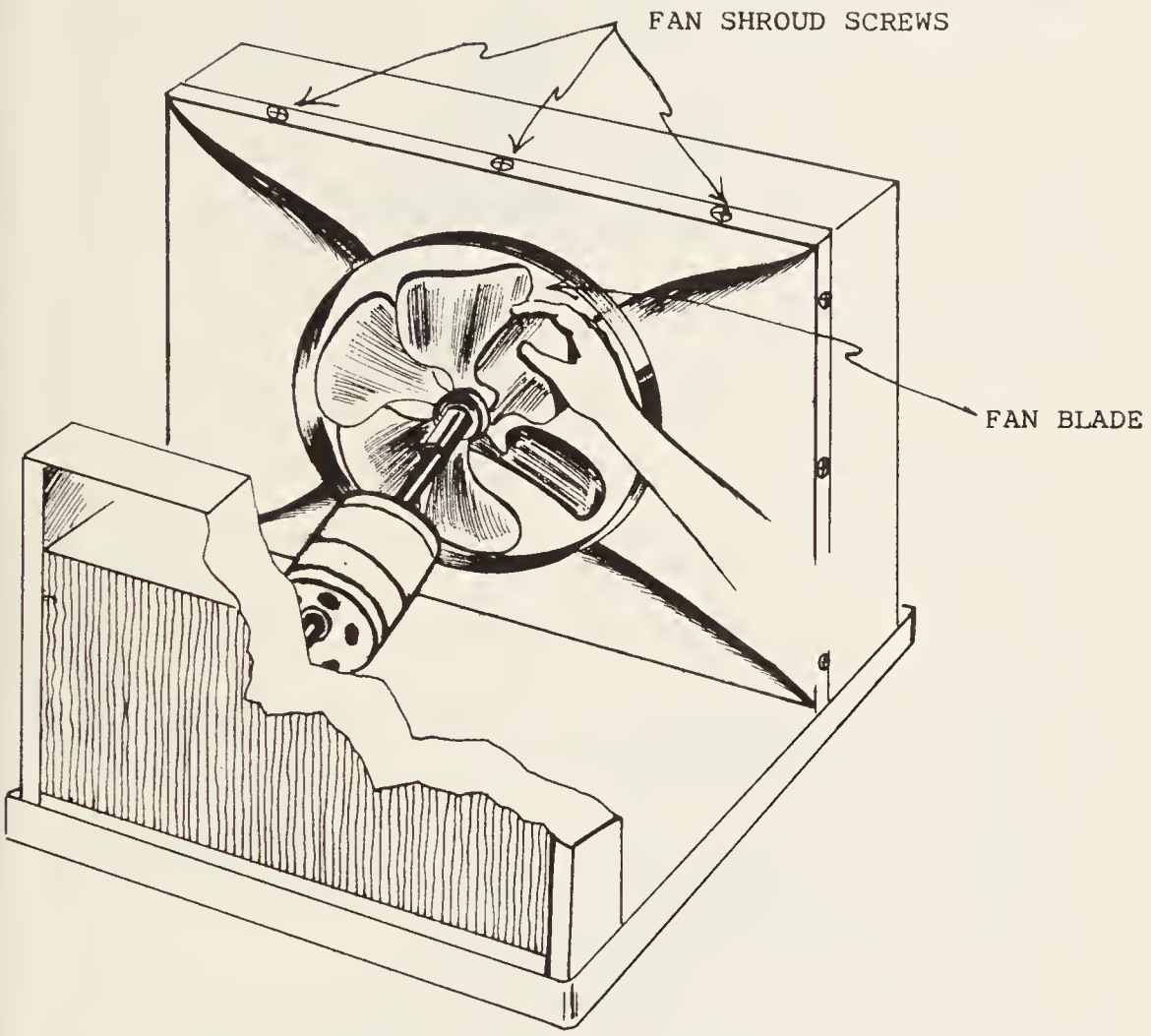
NOTE: The normal vibration produced by the motor-compressor of an air conditioner is suppressed by the use of shock absorbing springs or rubber grommets placed under each mounting leg. *(Figure 7)* Should the spring collapse or the rubber grommet deteriorate, the vibration of the motor-compressor will be transmitted through the chassis pan and result in the machine vibrating excessively. If the shock absorbing springs or rubber grommets are found to be defective, a qualified appliance repair technician should be called to install new ones.

14. Retest unit for noise before replacing it in cabinet. Plug line cord into wall outlet and operate unit in a "high cool" position.

CAUTION: Be careful to keep hands, tools, etc. away from fan blades when operating unit without cabinet. Also avoid operating unit outside of cabinet for more than a few minutes to prevent overheating in some units.

NOTE: If objectionable noise seems to stem from air as it flows past the front plastic grille opening (much the same as the noise produced when blowing across a playing card held edgewise in front of your lips), then the problem is inherent in the design of the air conditioner and nothing can be done to reduce the noise except to lower the fan speed.

FIG. 8



Problem Solver #20

APPLIANCE: Room Air Conditioners

PROBLEM: **Room(s) not cooled enough.**

EXPLANATION: When this problem is encountered with a newly installed air conditioner, the possibility of having purchased too small a unit must be seriously considered. For older units, the cooling capacity (the amount of space an air conditioner can effectively cool) is often greatly reduced when simple maintenance procedures have been neglected.

TOOLS AND MATERIALS NEEDED:

(a) a phillips screwdriver

(b) a nutdriver (¼ inch)

(c) a small wire brush

(d) a fin-straightening comb

(e) a vacuum cleaner with venetian blind cleaning attachment

SOLUTION:

1. Check to see that there is no obstruction to the free flow of air from the outside (condenser) of the unit. *(Figure 1)*

   NOTE: Adjacent walls, fences, etc. may have been erected after the air conditioner was installed. Anything that causes the hot condenser air to "pocket" will impede its circulation and reduce the efficiency of the air conditioner. If the obstruction cannot be eliminated, then moving the air conditioner to a different location must be decided upon.

2. Inspect the fan side of the condenser for accumulation of caked-on dust and dirt with the aid of a flashlight. *(Figure 2)*

FIG. 1

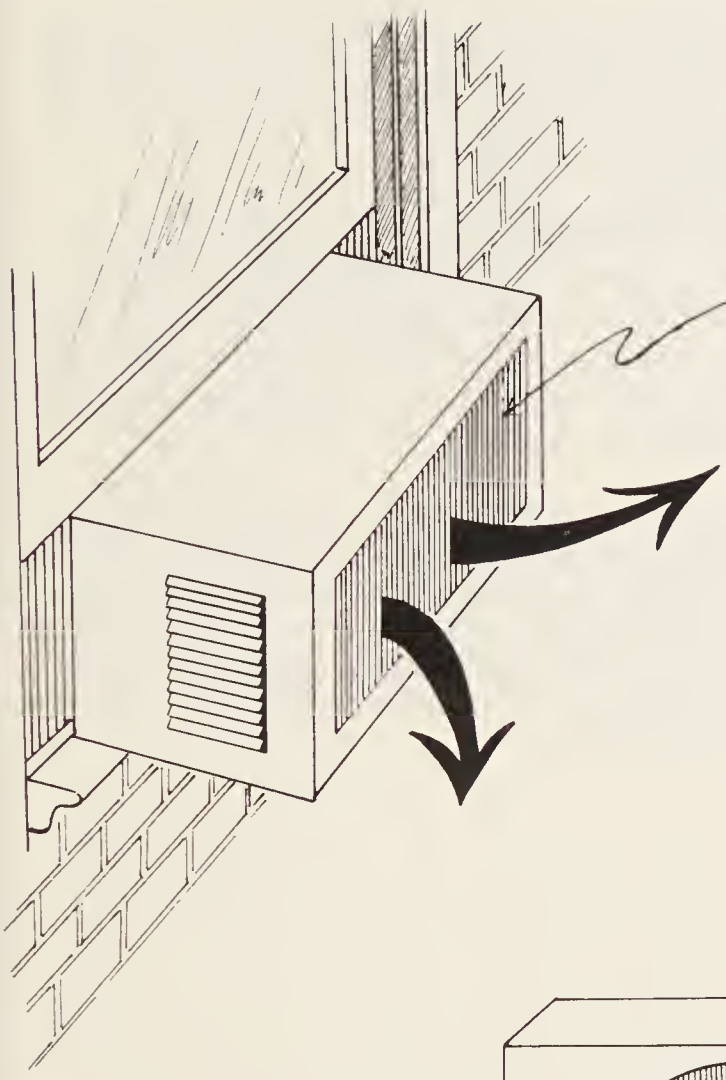
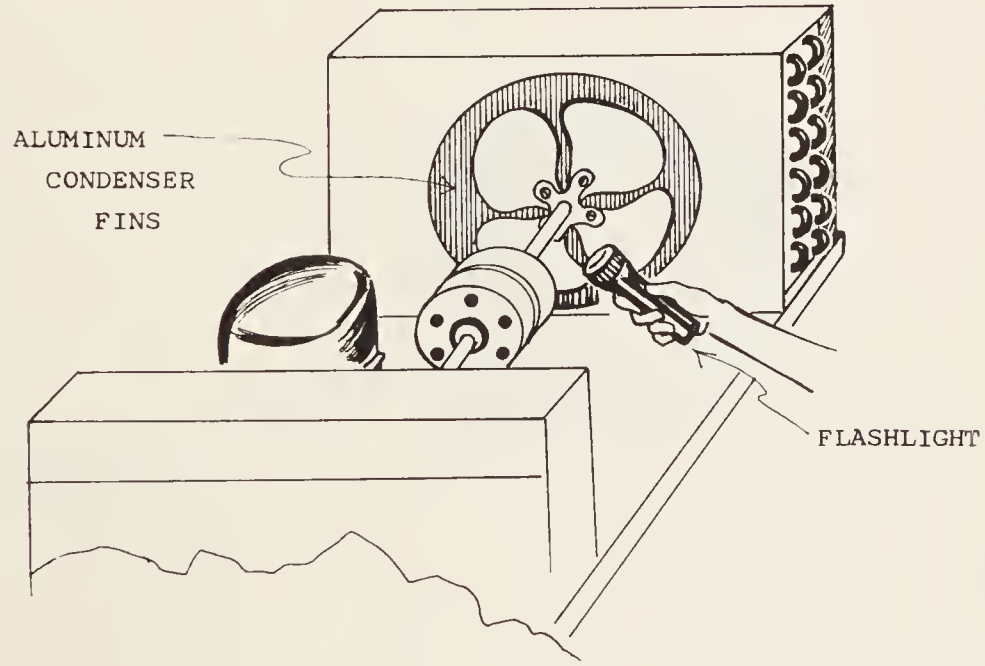

OUTSIDE
CONDENSER
UNIT
AIR FLOW

FIG. 2


ALUMINUM
CONDENSER
FINS
FLASHLIGHT

NOTE: Dust and dirt, accumulating on the inside surface of the condenser, can clog it. This will necessitate removing the chassis from the cabinet. Refer to problem solver #19 for removal information and illustrations.

3. Reach behind the fan and clean the condenser with a small wire brush. Brush the condenser in the same direction as the aluminum fins run. *(Figure 3)* Vacuum loosened dirt with vacuum cleaner using venetian blind cleaning attachment on hose.

NOTE: There are two types of aluminum fins used on room air conditioners. On most units the fins run parallel in vertical lines. *(Figure 2)* On some units the aluminum fins resemble spines. *(Figure 4)* This type cannot be cleaned with a wire brush. Cleaning procedure for this type will be discussed in later steps.

FIG. 3

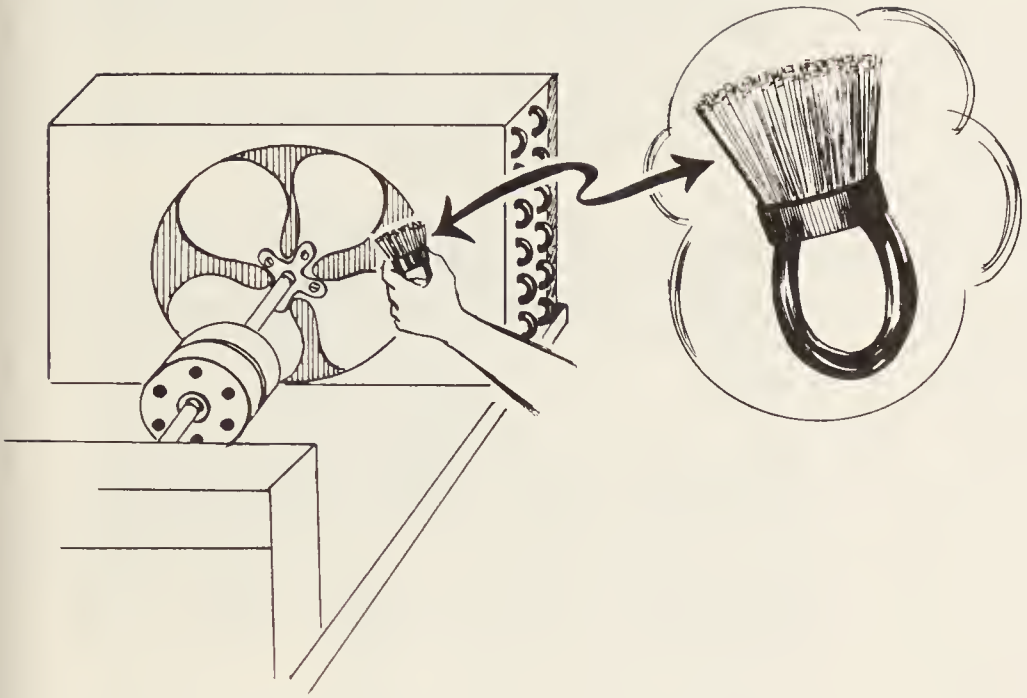
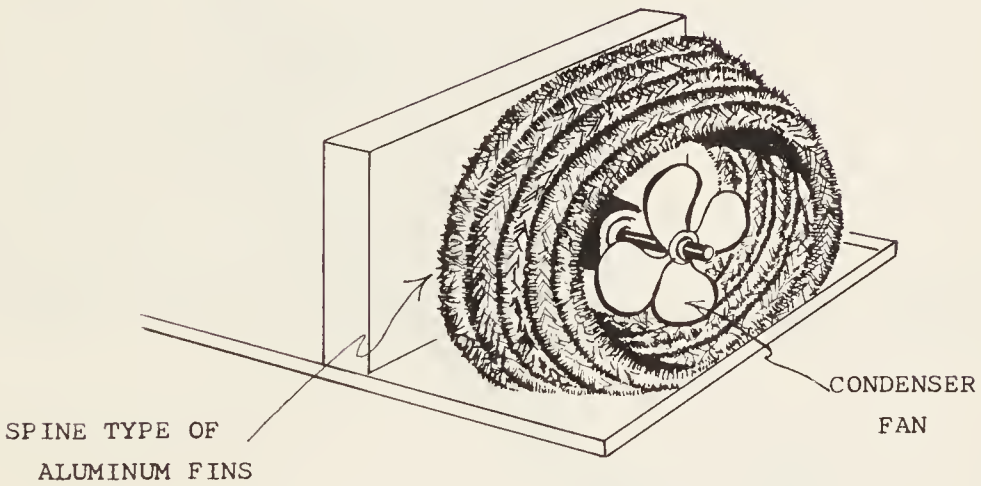


FIG. 4



4. If the aluminum fins are bent (which can also impede the air flow), use a fin-straightening comb to adjust them. Insert teeth of comb carefully into fins (one tooth–one fin, etc.) and pull comb slowly through fins. *(Figure 5)*

   NOTE: Fin-straightening combs are sold in different sizes to fit different fin spacing. Measure the number of fins per inch, then purchase the fin comb with the correct number of teeth per inch to match.

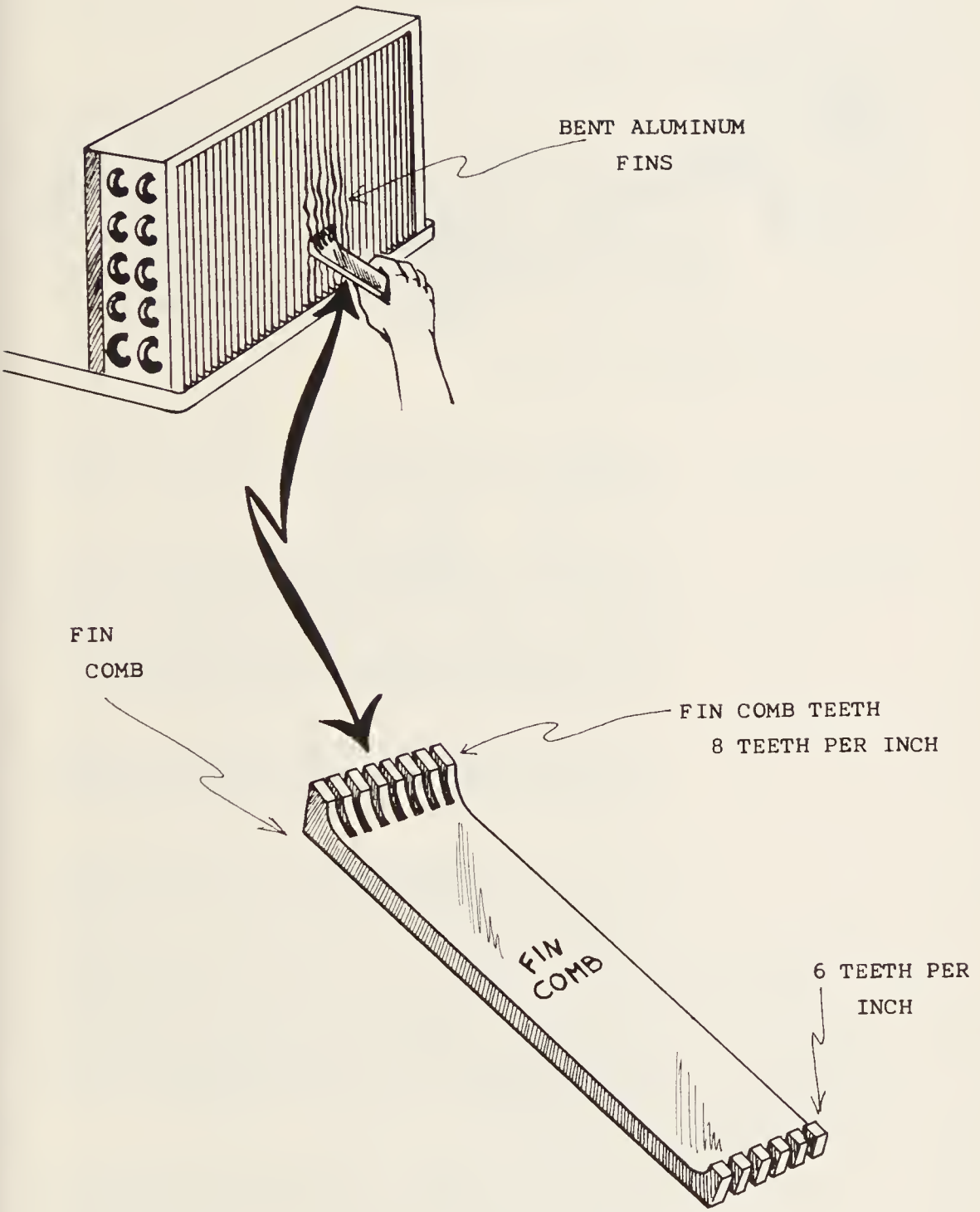
5. Spine type aluminum fins are difficult to clean. Good results can be obtained outdoors by using a high pressure stream of water (garden hose) and detergent. Allow unit to dry thoroughly (at least six hours) before reinstalling and using machine.

   NOTE: If access to garden hose is not available, refer cleaning to a service company.

6. Carefully reinstall units to avoid damage to copper tubing and aluminum fins.

   SPECIAL NOTE: Good maintenance practices call for periodic cleaning of the condenser. The cleaning frequency may vary with the locale and amount of use. In areas where the air contains a high level of dirt (smog), cleaning must be done more often. In hot climate areas where units are used over longer periods of the year, again more frequent cleaning becomes necessary. Maintaining a clean, properly serviced air conditioner increases its life span and insures maximum (money-saving) efficiency during operation.

FIG. 5


BENT ALUMINUM
FINS
FIN
COMB
FIN COMB TEETH
8 TEETH PER INCH
FIN
COMB
6 TEETH PER
INCH

Problem Solver #21

APPLIANCE: Automatic Dishwashers

PROBLEM: **Some dishes do not get clean.**

EXPLANATION: Food may not be totally removed from some dishes by the dishwasher for a number of reasons —food residue is allowed to dry hard on plates that are placed in dishwasher without pre-rinsing; low hot water temperature; or, most likely, dishes have been improperly stacked in the dishwasher.

TOOLS AND MATERIALS NEEDED:

(a) a dial thermometer (meat type or one commonly used to measure temperature of cooking liquids)

SOLUTION:

1. Examine food left on dishes. If food residue is caked on, make certain dishes used for foods that are stubborn to remove when dry are rinsed before being placed in dishwasher.

   NOTE: Many newer model dishwashers have a pre-rinse cycle which allows dishes to be rinsed in the machine and stored there to await washing.

2. Check the degree of the hot water temperature. Allow hot water to run in sink until water reaches maximum temperature, then measure temperature with a dial thermometer. *(Figure 1)* Temperature of hot water must be a minimum of 150 degrees F. If it is lower, hot water equipment (boiler) should be inspected and adjusted by a qualified plumber.

3. Make certain that correct loading technique is used at all times. Avoid "nesting" and "blocked spray" conditions which prevent the water spray from reaching some of the dishes. *(Figures 2 and 3)*

FIG. 1

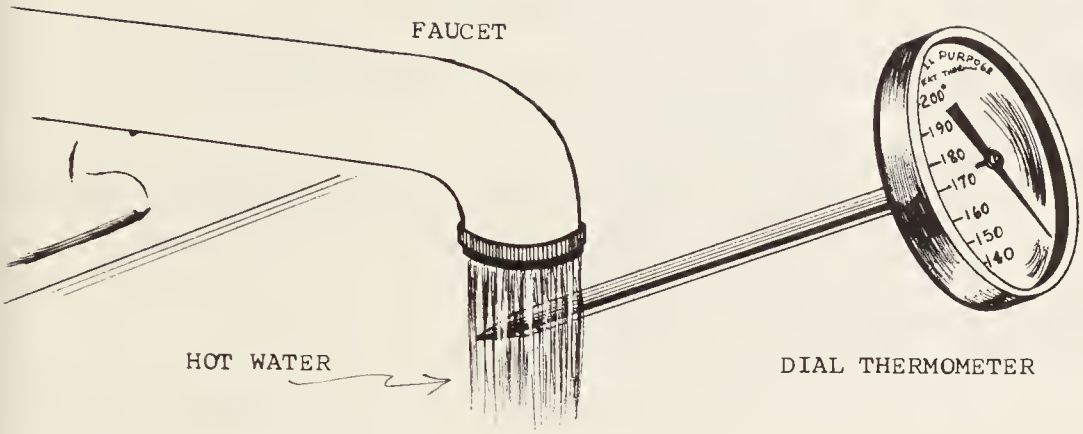


FIG. 2 NESTING

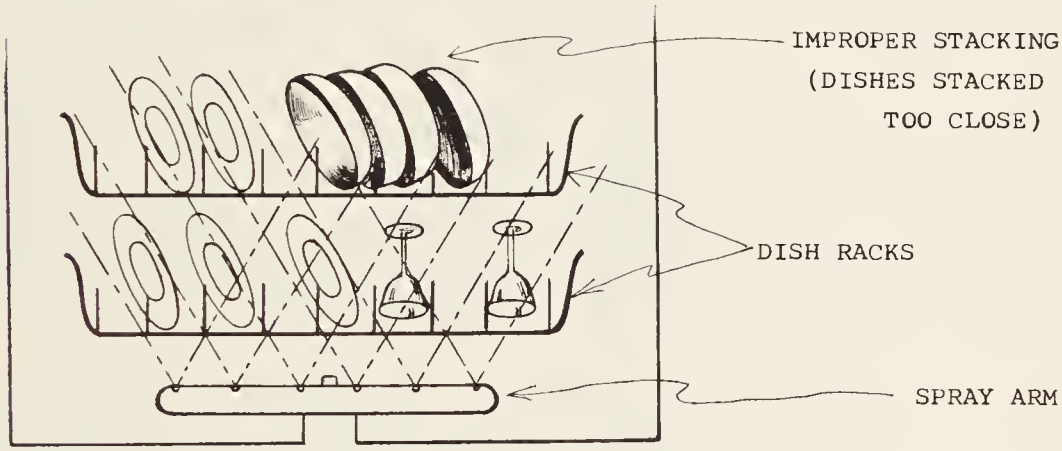
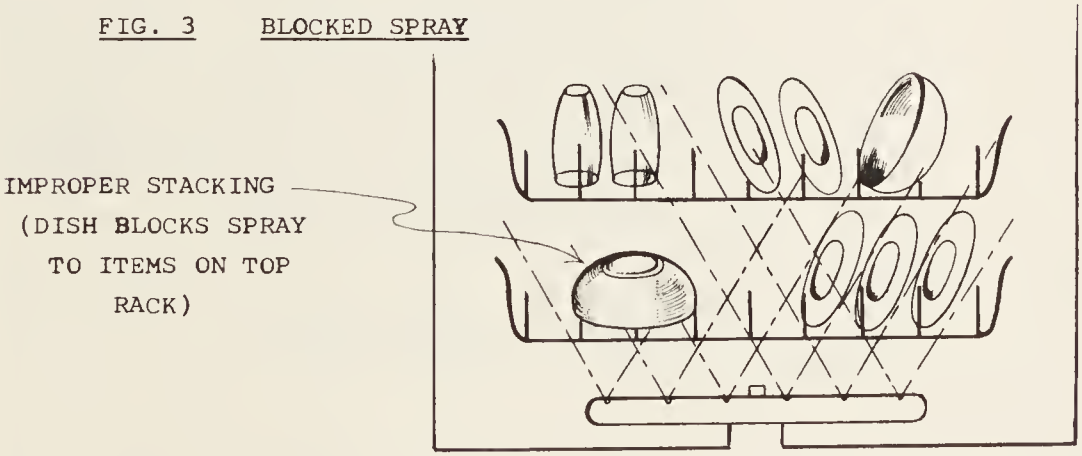


FIG. 3 BLOCKED SPRAY



Problem Solver #22

APPLIANCE: Automatic Dishwashers

PROBLEM: **Glassware is damaged during washing.**

EXPLANATION: Damage to glassware may appear in several ways. Glasses may become scratched or chipped and, in other cases, may acquire a permanent film.

TOOLS AND MATERIALS NEEDED:

(a) Manufacturer's use and care booklet

SOLUTION:

1. Examine glasses carefully to identify the type of damage. If they appear scratched or chipped, the damage was due to an abrasive action. This damage is called "mechanical etching" and is caused by improper loading which allows two or more items to rub against each other during the washing cycle. *(Figures 1 and 2)* To avoid "mechanical etching," stack glassware properly in rack.

2. If "etching" on glass appears more as a film than a scratch, it is the result of a chemical action caused by a combination of soft water and too much detergent. This chemical reaction bonds the film permanently to the glass. *(Figure 3)* To avoid "soft water etching," follow manufacturer's operating instructions which often recommend types and quantity of cleaning agents to be used.

   NOTE: Soft water is water containing small amounts of natural minerals.

FIG. 1 MECHANICAL ETCHING

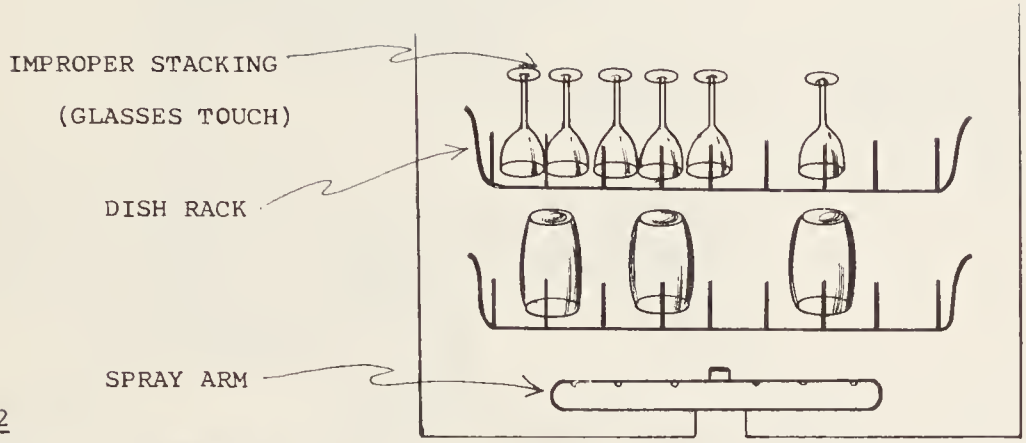
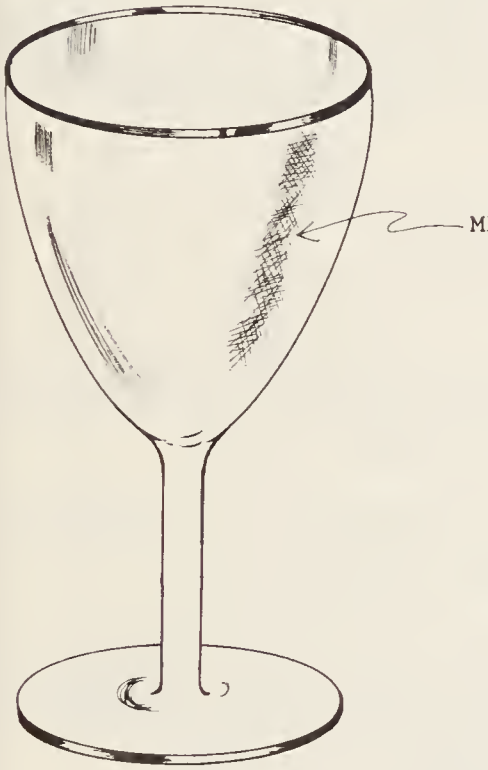


FIG. 2



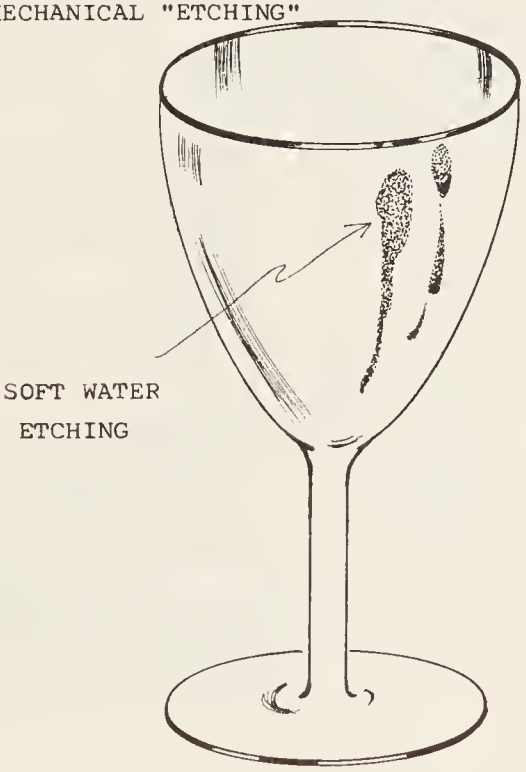


FIG. 3

Problem Solver #23

APPLIANCE: Automatic Dishwashers

PROBLEM: **Water leaks from door.**

EXPLANATION: The water spray used for washing and rinsing is discharged from the spray arms with a good deal of force. If the door gasket does not make a good seal, water will get past the door and leak onto the floor.

TOOLS AND MATERIALS NEEDED:

(a) a can of scouring cleanser and appropriate cleaning cloth

(b) a phillips screwdriver (medium)

(c) a flatblade screwdriver (medium)

SOLUTION:

1. Examine the door gasket (located either on the door or inside the cabinet) for stuck-on food or damage. *(Figures 1 and 2)*

2. Remove stuck-on food by cleaning gasket with scouring cleanser.

   NOTE: If the gasket appears damaged (broken or pieces missing), it must be replaced. New gasket should be replaced by an appliance technician who is qualified to make this type of repair.

   If the gasket appears good, the leak may be caused by insufficient door pressure against the gasket.

FIG. 1

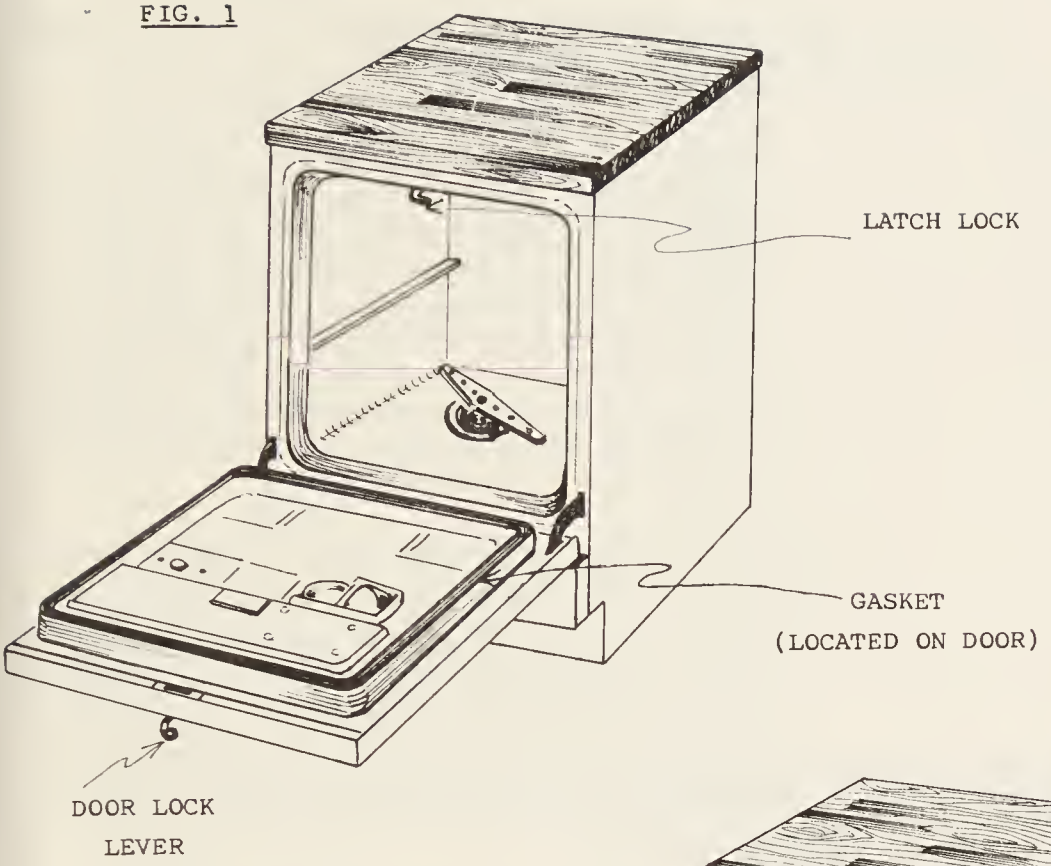
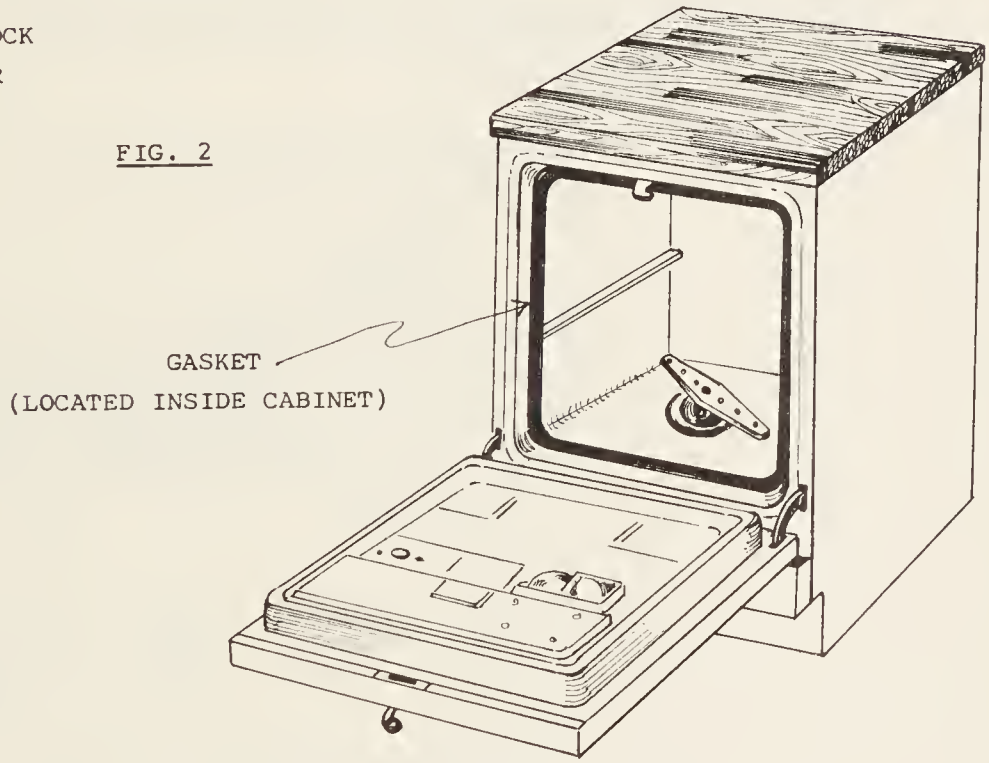

LATCH LOCK
GASKET
(LOCATED ON DOOR)
DOOR LOCK
LEVER

FIG. 2


GASKET
(LOCATED INSIDE CABINET)

3. To adjust the door pressure, locate the door latch lock. *(Figure 3)*

   NOTE: The design of door lock mechanism will vary with each make and model. Its appearance, therefore, will also vary. The door lock shown in *Figures 1 and 3* simply illustrates the common appearance of most dishwasher door locks. Door locks in dishwashers are often referred to as "interlocks" since, in addition to physically locking the door, they also contain an electrical switch that prevents the machine from operating unless the door lock lever is in closed position.

4. Loosen (do not remove) the two screws (phillips or slotted-head type) used to fasten the latch lock by turning them counter-clockwise with an appropiate screwdriver. Carefully move the latch lock towards the rear of the dishwasher about one-eighth of an inch. Retighten the fastening screws securely. *(Figure 3)*

   NOTE: Make certain that the serrations on the latch lock are fitted into the serrations on the plate. *(Figure 4)*

5. Operate dishwasher through cycle and retest for leaks. If water continues to leak from door, move the latch lock another one-eighth inch toward the rear of the dishwasher. Repeat this adjustment, if necessary, until leak stops.

FIG. 3

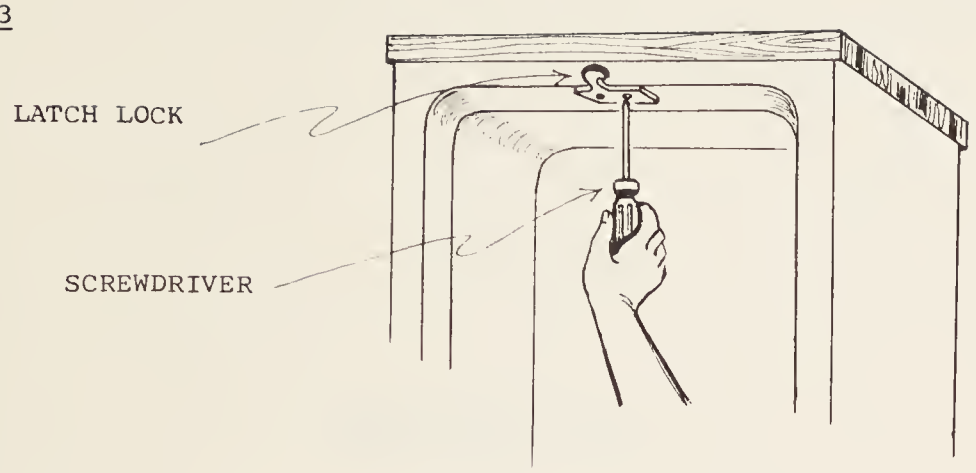
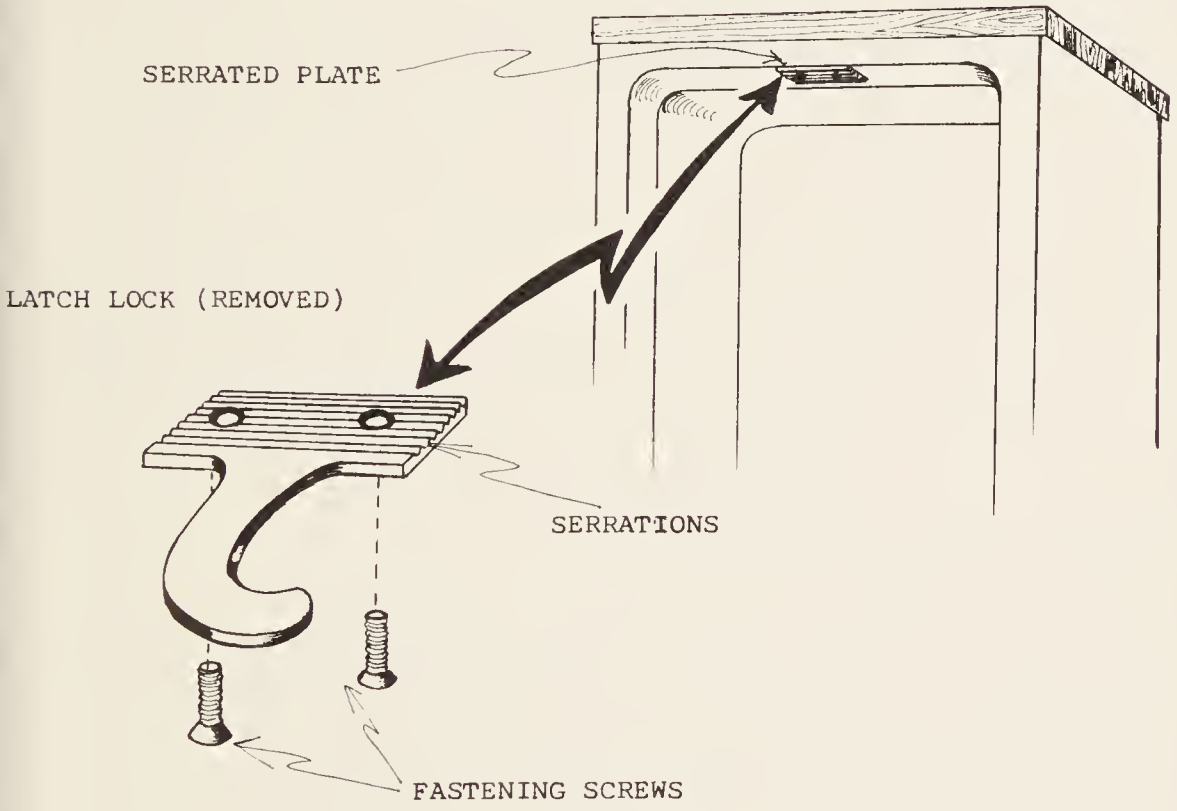

LATCH LOCK
SCREWDRIVER

FIG. 4


SERRATED PLATE
LATCH LOCK (REMOVED)
SERRATIONS
FASTENING SCREWS

Section II

General Repair Procedures

#24 Fuses and Circuit Breakers

HOW TO: Locate and replace a blown fuse.

EXPLANATION: Fuses are safety devices. Their purpose is to protect electrical equipment (appliances) and the electical house wires from damage. When a fuse blows, it is an indication that the demand for electric power has exceeded the safe carrying capacity of the electric supply line. A fuse contains a short metal link through which all of the electric power in a supply line must flow. The metal link is designed to melt apart when the electric power flowing through it is excessive and generates more heat than the metal fuse link can withstand. The types of fuses most commonly found in home use are constructed with a screw base and are called plug fuses. There are three common varieties of plug fuses: (1) standard base; (2) standard base, time delay; and (3) tamperproof (fusestat). *(Figure 1)* Time delay fuses are designed to withstand short periods of excessive electric power draw without blowing. This feature is especially useful in house circuits that supply motordriven appliances (washing machines, refrigerators, clothes dryers, etc.). The ordinary standard base and tamperproof base fuses are generally adequate for use with heating appliances.

TOOLS AND MATERIALS NEEDED:

(a) a replacement fuse (same electrical rating—in amperes—and type as original)

(b) a flashlight

FIG.1 PLUG TYPE FUSES

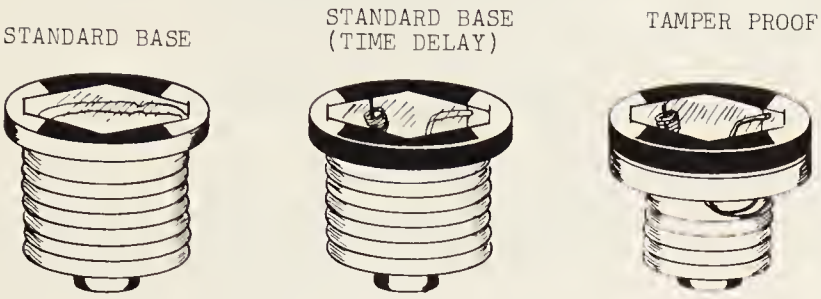
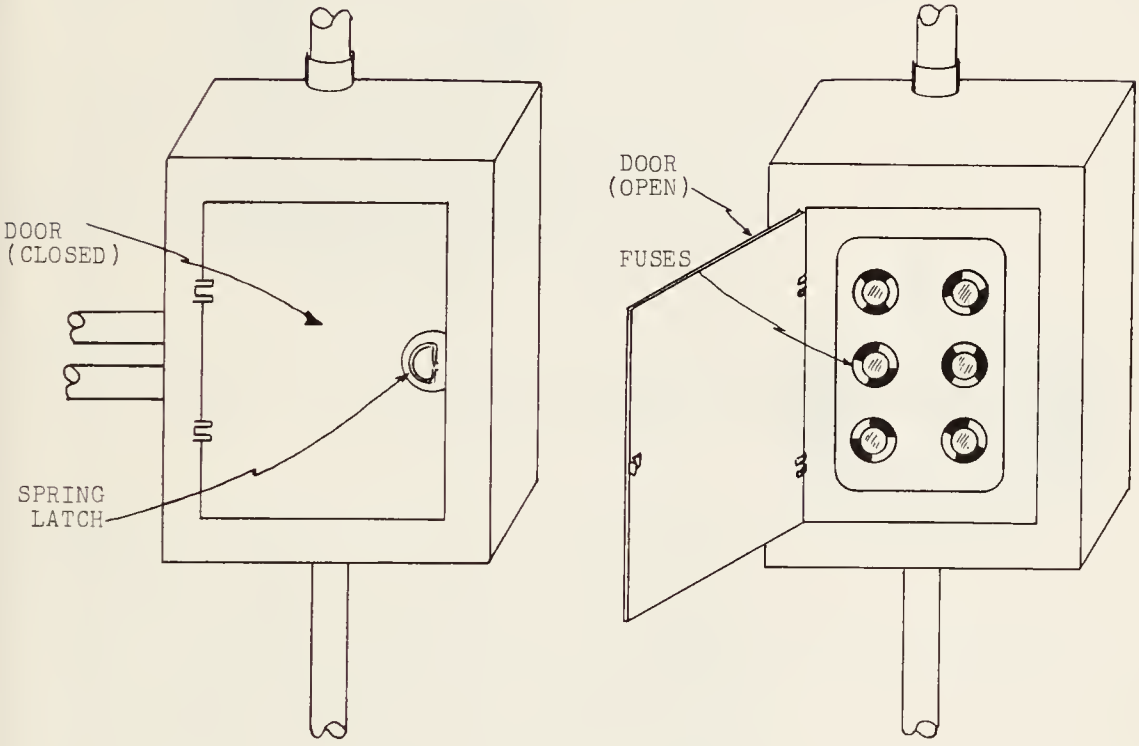


FIG.2 TYPICAL FUSE BOX



STEPS:

1. When fuse is suspected of having blown, turn off all switches (appliances, lights, etc.) that have stopped operating.

2. Locate fuse box that contains the house fuses. *(Figure 2)*

3. Examine the small window of each fuse in the fuse box. Use a flashlight to aid visibility. The window of a blown fuse (or fuses) will usually appear blackened or clouded.

   NOTE: Some electric lines use two fuses for protection.

4. Remove the suspect fuse by unscrewing it (counter-clockwise) from its socket.

5. Examine fuse to identify its electrical size and type. Its electrical size (in amperes, or amps) is usually printed on the metal edge surrounding its window and on the small metal contact tip on its base. *(Figure 3)*

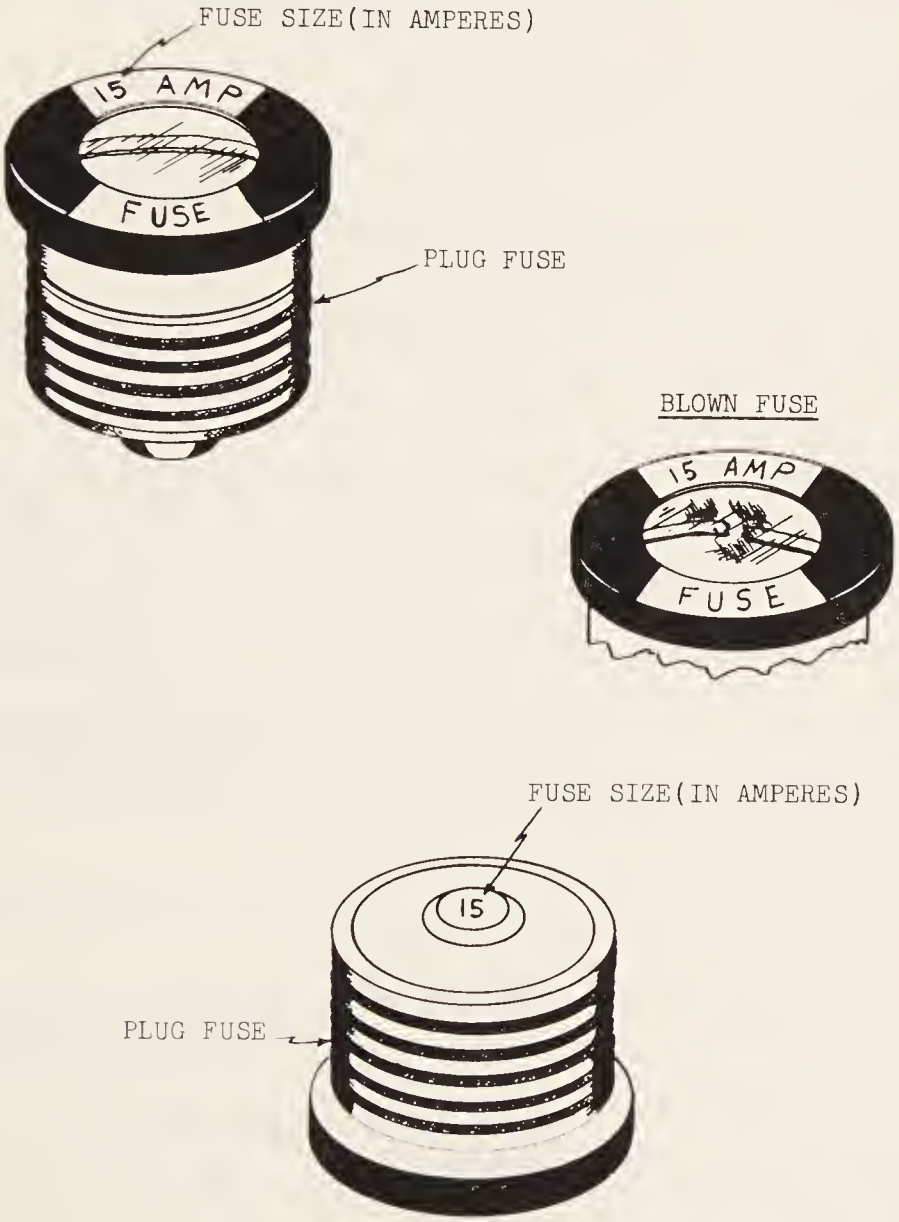
6. Select a replacement fuse that is identical to the blown fuse and screw the new fuse (or fuses) into the fuse socket.

   NOTE AND CAUTION: Standard base plug fuses are made available in sizes of 5 amps, 10 amps, 15 amps, 20 amps, 25 amps, and 30 amps. Since the screw bases of these fuses are identical, they may accidentally be interchanged. Extreme precautions should be taken to avoid replacing a blown fuse with one which has a higher amp rating. Tamperproof plug fuses are also available in the amps sizes listed above. Their screw base construction, however, does not permit different size fuses to be interchanged since different sized screw bases are provided for each electrical size.

7. After fuses have been replaced, turn on appliances, lights, and other electrical apparatus that had gone dead.

NOTE: If circuit fuse blows again when appliance or other electrical apparatus is turned on, it indicates that the electrical overload is still present and must be disconnected from the power line. In most instances, the faulty appliance or other electrical apparatus can be identified by elimination. This will require a systematic trial of each appliance. If, however, the defective apparatus cannot be isolated after a reasonable effort has been made, a licensed electrician should be called to correct the condition.

FIG.3



#25 Male Plugs

HOW TO: Replace a two-prong male plug.

EXPLANATION: Although most modern major household appliances are equipped with three-pronged plugs (see discussion of these on page 158), there are still a few major appliances (notably refrigerators) that have two-prong male plugs. In such cases the plug is referred to as a heavy-duty plug and is shown in the accompanying illustrations.

TOOLS AND MATERIALS NEEDED:

(a) a heavy-duty two-prong male plug (available at any electrical hardware store)

(b) a sharp paring knife

(c) a flatblade screwdriver (medium size)

STEPS:

1. Remove the defective plug by cutting the line cord about one-half inch before the plug; then discard it. This will eliminate any weakened, frayed, or oxidized wire that might interfere with the operation of the new plug. *(Figure 1)*

2. Remove about three inches of outer insulation (when encountered) by slitting it lengthwise with a sharp knife. *(Figure 2)*

   CAUTION: Take care not to cut throught the inner wire insulation.

3. Remove about one inch of the inner rubber insulation from each wire end. *(Figure 3)*

   CAUTION: Avoid cutting any of the fine wire strands.

FIG.1

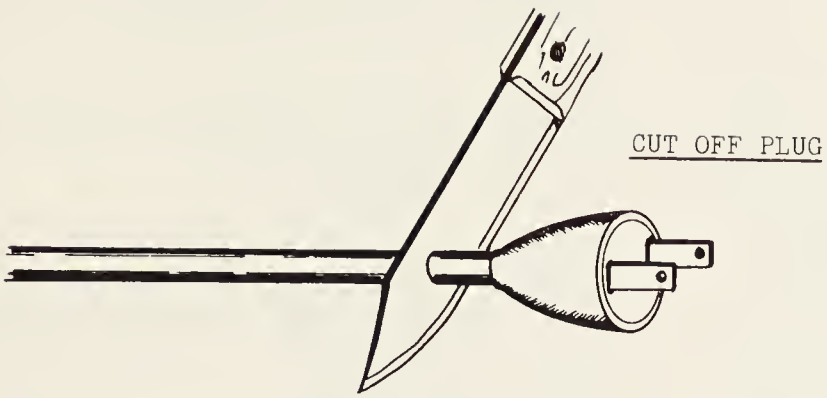


FIG.2

REMOVE OUTER INSULATION

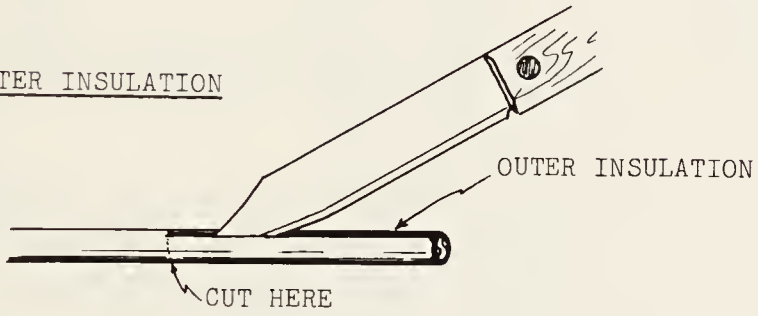
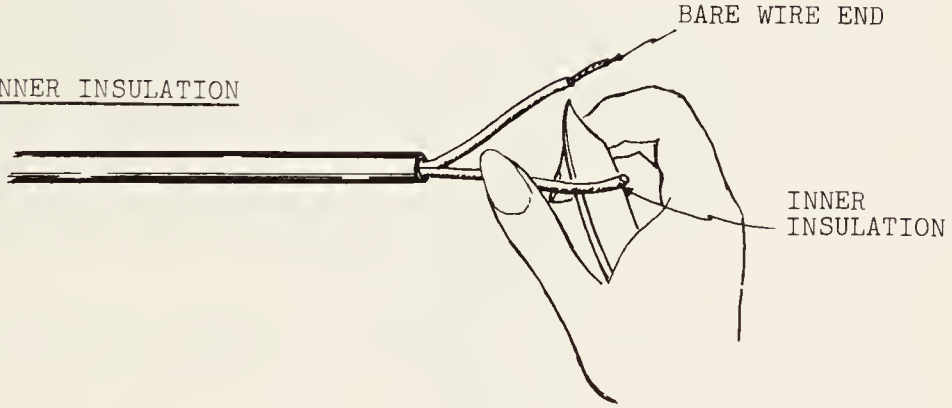


FIG.3

REMOVE INNER INSULATION



4. Feed the wire ends of the remaining prepared line cord through the replacement male plug and tie an "Underwriter's knot" as shown in steps a, b, and c of *Figure 4.*

5. Twist the loose strands of each wire end together tightly. *(Figure 5)*

   CAUTION: Carefully straighten the wire strands before attempting to twist them together to prevent wire strands from puncturing fingers.

6. Pull the Underwriter's knot down into the cavity of the plug.

7. Loosen both terminal screws of the plug, but do not force them beyond their stop points. *(Figure 5)*

8. Bring each line cord wire end around the back of each prong, and wrap the bare wire portion of each end around and under the plug terminal screws in a clockwise direction. *(Figure 6)*

   NOTE: Avoid getting insulation caught under the terminal screws.

9. Cut off any excess wire that protrudes from under the terminal screw heads and tighten the screws with a screwdriver.

   NOTE: Make certain that there are no loose strands of wire that can touch both of the plug prongs and cause a short circuit.

10. Slide the fiber cover plate over the prongs. *(Figure 6)*

FIG.4

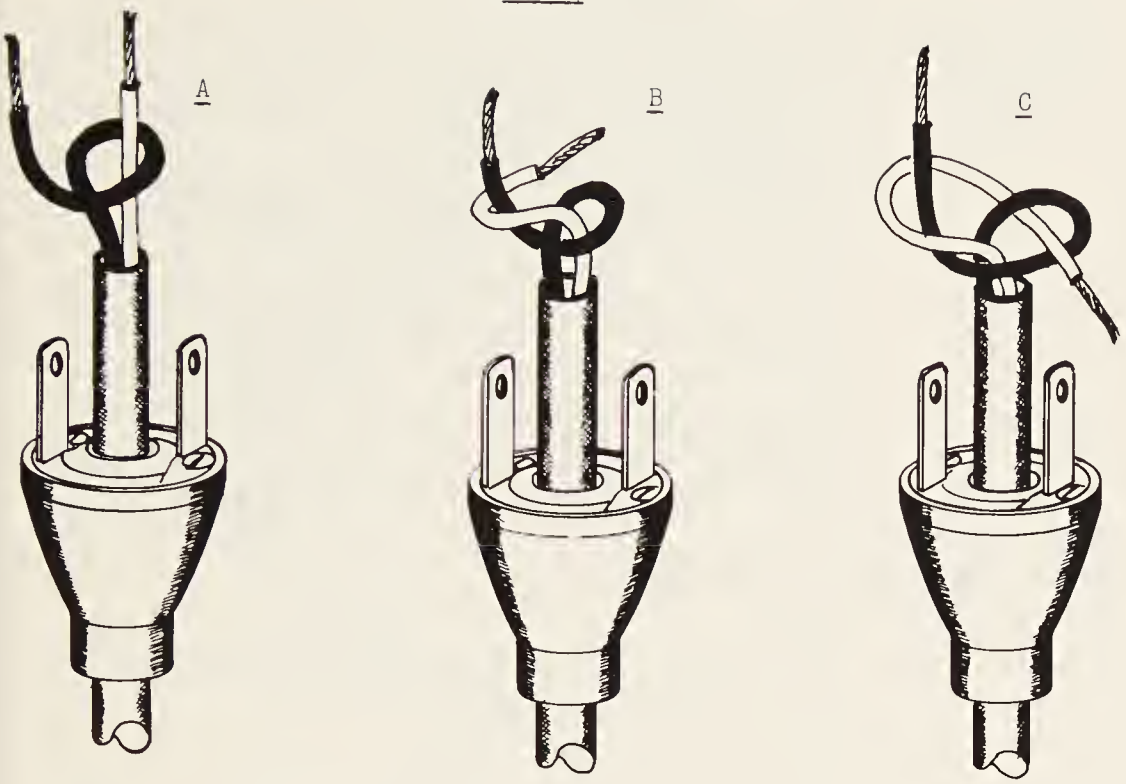


FIG.5

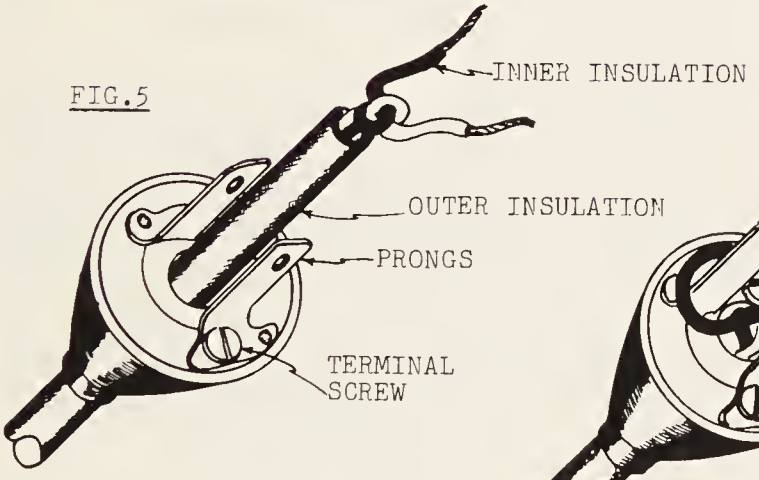
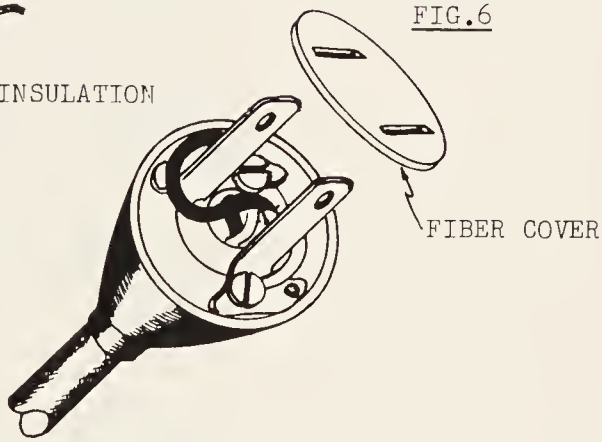


FIG.6



HOW TO: Replace a three-prong male plug.

EXPLANATION: Major appliances use male plugs that have three prongs. One of the prongs is used to connect the appliance to ground. This is a safety feature that can prevent dangerous electric shock to the user should certain types of electrical malfunction occur in the machine. Major appliance plugs will vary in size, shape, and position of their prongs according to the voltage and current usage of the appliance. Always replace a defective plug with one that meets all of the requirements of the original. If in doubt, have electrical supply store personnel select the correct replacement.

TOOLS AND MATERIALS NEEDED:

(a) a metal clad three-prong plug (as required)

(b) a sharp paring knife

(c) a flatblade screwdriver (medium)

SOLUTION:

1. Remove the defective plug by cutting the line cord about one and one-half inches before the plug. This will eliminate any weakened, frayed, or oxidized wire that might interfere with the operation of the new plug. *(Figure 1)*

2. Cut apart the three wires of the line cord with a paring knife for about three inches. *(Figure 2)*

CAUTION: Avoid removing insulation or cutting into wire.

FIG. 1

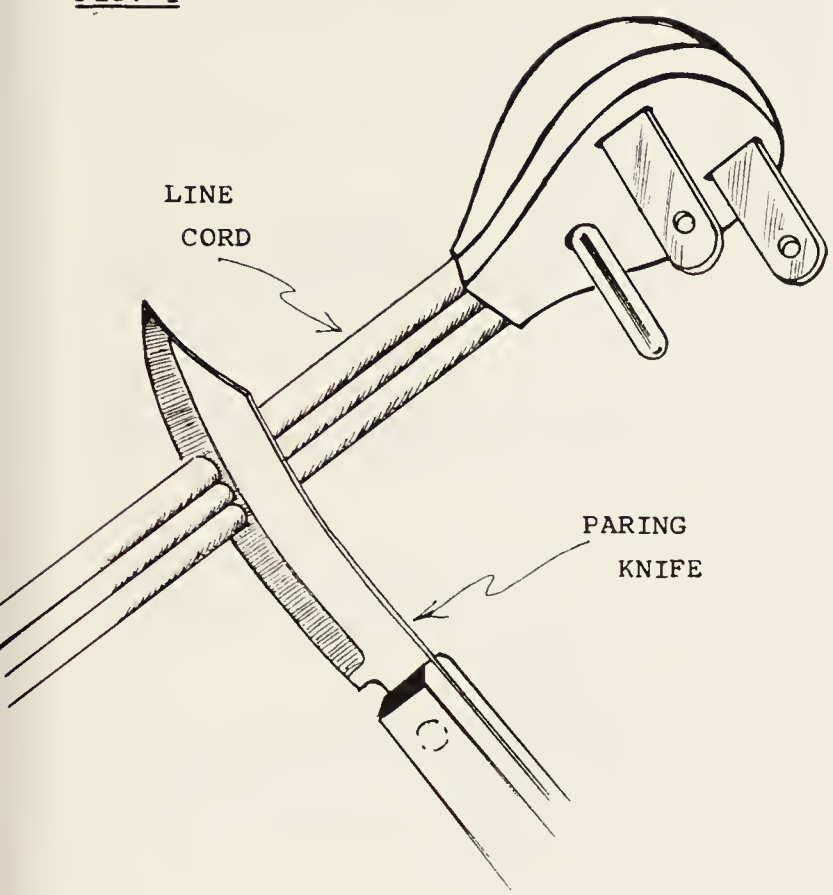
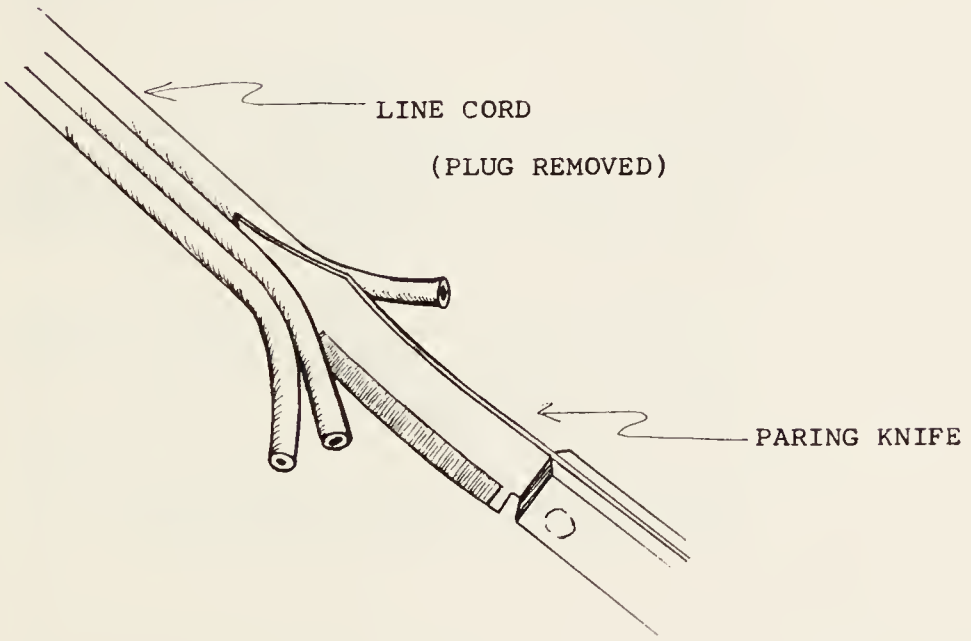

LINE
CORD
DEFECTIVE
PLUG
PARING
KNIFE

FIG. 2


LINE CORD
(PLUG REMOVED)
PARING KNIFE

3. Remove about one inch of insulation from each wire end. *(Figure 3)*

   CAUTION: Avoid cutting off any of the fine wire strands.

4. Twist the loose strands of each wire end together tightly and feed them through the new plug. *(Figure 4)*

   CAUTION: Carefully straighten the wire strands before attempting to twist them together to prevent wire strands from puncturing fingers.

5. Wrap the bare wire end of the green-colored wire *(Figure 4)* under the terminal screw of the ground prong in a clockwise direction.

   NOTE: The green-colored wire is always connected to the ground prong of a plug.

   CAUTION: Avoid getting any insulation under the terminal screw.

6. Cut off any excess wire that protrudes from under the terminal screw heads and tighten the screw with a flatblade screwdriver. *(Figure 5)*

7. Connect the remaining two wire ends to the terminal screws of the two flat prongs (either wire to either terminal) the same as for the ground wire.

   CAUTION: To prevent a short circuit, be certain there are no loose strands of wire from one terminal that can touch another.

8. Secure the line cord by tightening the line cord clamp screws with a screwdriver.

FIG. 3

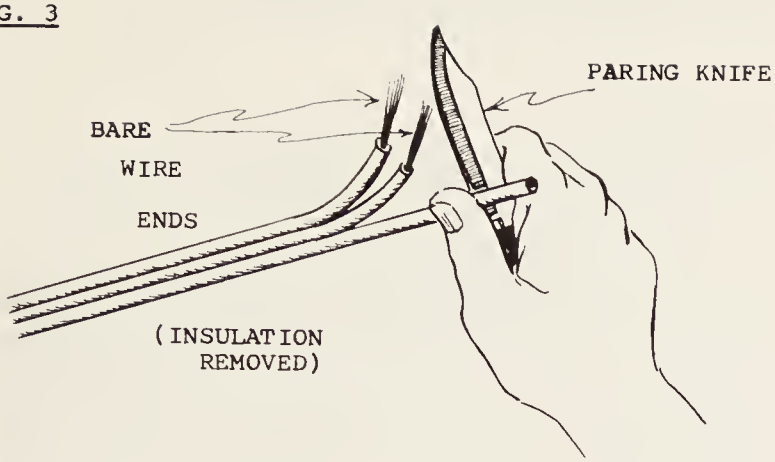


FIG. 4

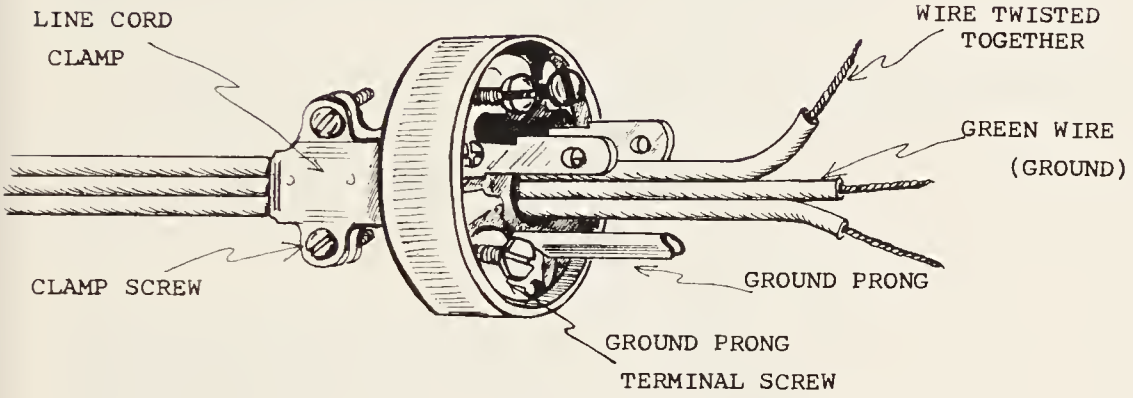
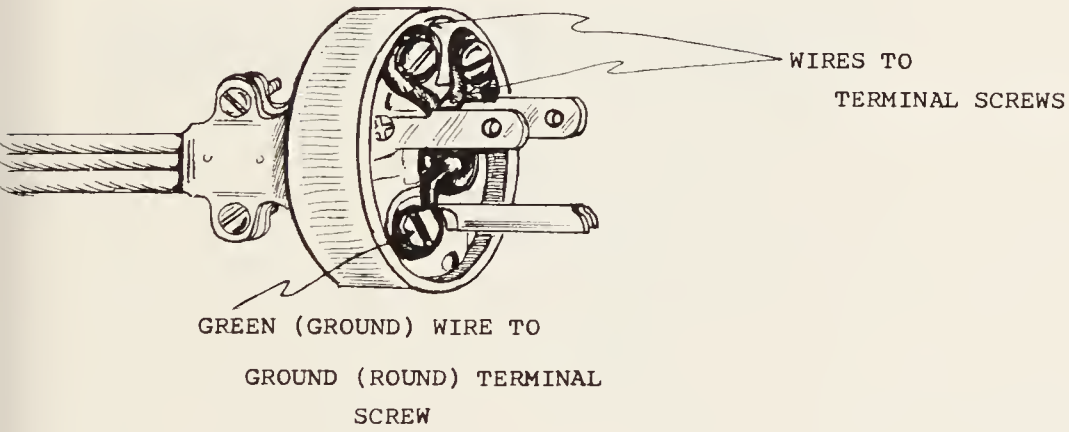


FIG. 5



#26 Terminals and Wire Connectors

HOW TO: Connect a wire end to a terminal.

EXPLANATION: In an electrical circuit, any point to which a wire end is connected is called a terminal. Terminals provide a convenient means of connecting electrical parts to their respective wires. In appliances, the most common types of terminals used are the "terminal screw" and the "male terminal spade." Since each terminal secures wire differently, the preparation of the wire ends will depend upon the type of terminal used.

TOOLS AND MATERIALS NEEDED:

(a) a flatblade screwdriver (medium size)

(b) a sharp paring knife

(c) a solderless wire connector (size and type as required) purchased at electrical hardware store

(d) a crimping tool (for solderless wire connectors), available at local electrical hardware store

(e) a pair of long-nose pliers

(f) an emery board

FIG.4

HOOKED WIRE ENDS OF LINE CORD INSTALLED ON TERMINAL CONNECTORS

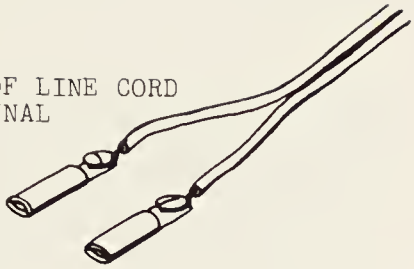


FIG.5

TERMINAL CONNECTORS INSTALLED IN HALF OF NEW PLUG

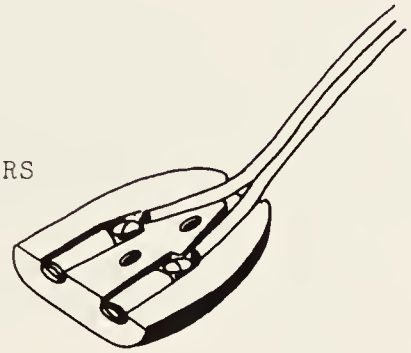
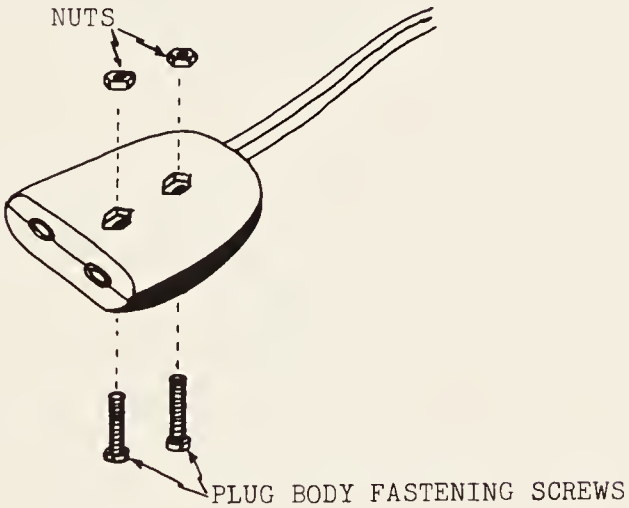


FIG.6



STEPS:

1. Prepare the wire end for connection to terminal screw.

   NOTE: A wire may be connected to a terminal screw in one of two ways. In the first, the bare wire end is formed into a hook. The hooked wire end is then placed under the head of the terminal screw. In the second, an appropriate type of solderless terminal connector is first attached to the wire end. The terminal connector is then placed under the terminal screw.

2. To prepare the hooked wire type of connection, first remove about one-half inch of wire covering (insulation) from the wire end. *(Figure 1)* Use a sharp paring knife to cut through the insulation and pull the cut insulation off the wire end. *(Figure 2)*

   CAUTION: When cutting insulation, make certain that copper wire is not nicked or otherwise damaged by knife.

3. If the wire uncovered is solid (one single thick strand of copper), simply form the bare end into a hook with the tip of a pair of long-nose pliers. *(Figure 3)*

FIG.1

FIG.2

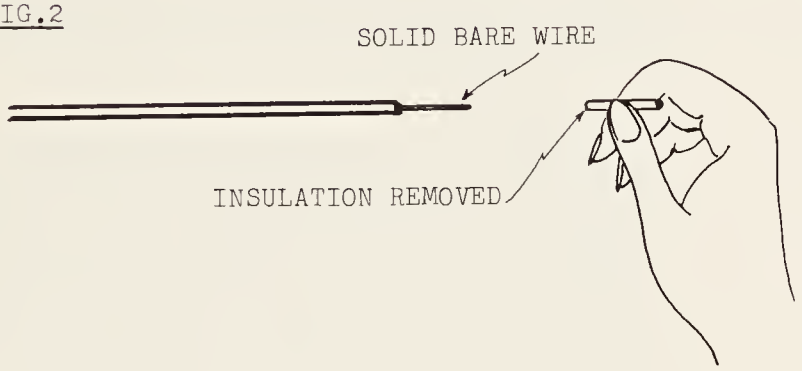
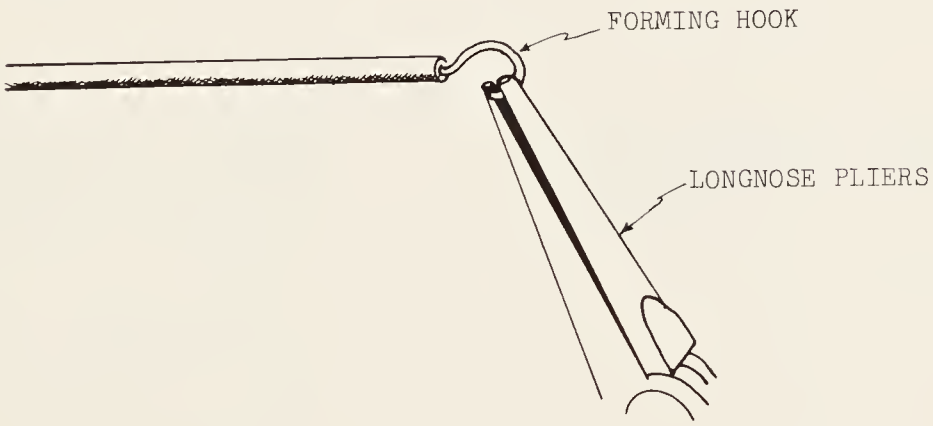


FIG.3



4. If the wire uncovered is stranded (many strands of fine wire) *(Figure 4),* twist the strands together tightly with fingers *(Figure 5);* then form it into a hook with the tip of the long-nose pliers. *(Figure 6)*

5. Place the bare wire hook under the loosened terminal screw, with the hook end facing the direction in which the screw tightens (clockwise). Tighten the terminal screw securely with a screwdriver. *(Figures 7 and 8)*

CAUTION: Do not overtighten terminal screw.

CAUTION: Make sure that none of the wire insulation (covering) gets under the terminal screw to prevent good contact.

CAUTION: Only *one* hooked wire end should be placed under any one terminal screw. If more than one wire is to be connected to a single terminal screw, the wire ends must first be prepared with an appropriate solderless terminal connector. *(Figure 9)* The steps that follow describe the procedures for installing solderless terminal connectors on wire ends for use under terminal screws.

FIG.4

FIG.5

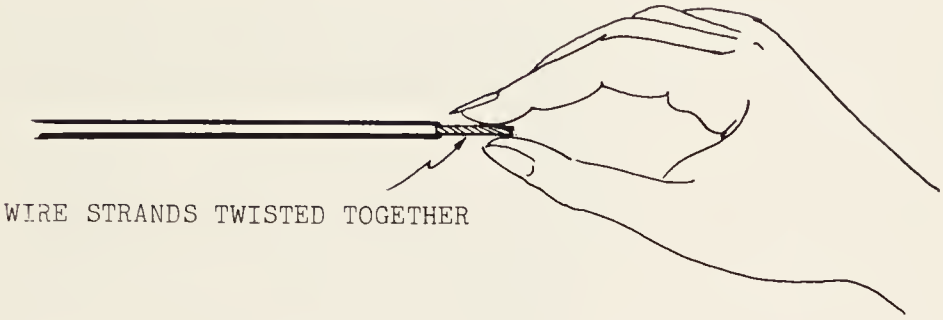


FIG.6

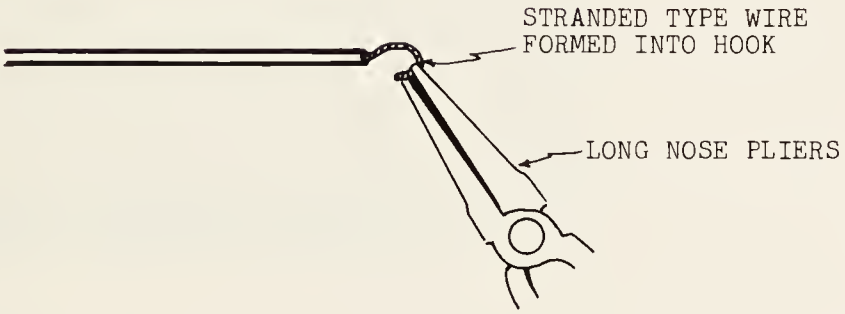


FIG.7

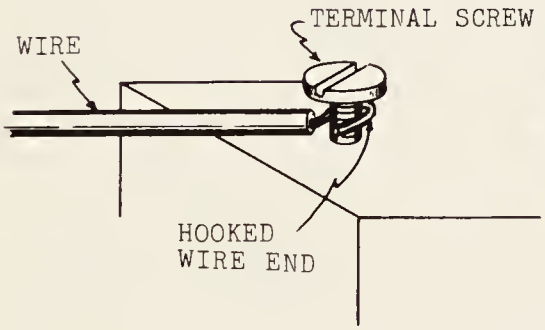
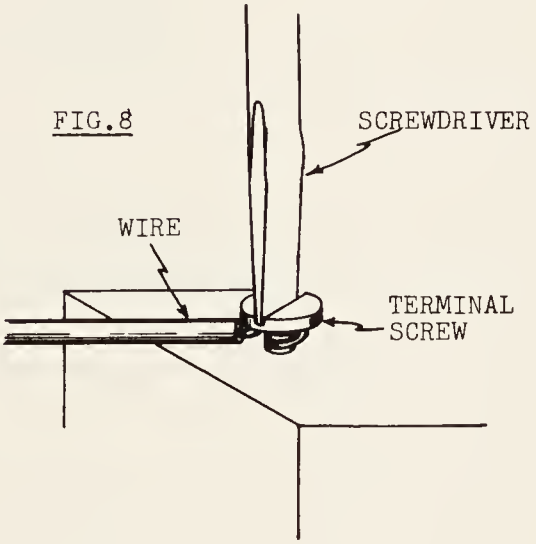


FIG.8



6. Remove about one-half inch of insulation from the wire end. Insert the bare wire end into the wire connector as far as insulation permits. *(Figure 10)*

7. Fasten the wire connector to the wire by placing it halfway into the appropriate size jaw opening of the crimping tool and squeezing the tool handles together hard. *(Figure 11)*

   NOTE: Solderless terminal connectors are made available in many sizes and types. Three important specifications are to be considered when selecting solderless terminal connectors for use with terminal screws. They are: the size (thickness) of the wire on which it is to be installed; the size (thickness) of the terminal screw body onto which it will connect; and the necessary shape of the terminal connector (spade- or ring-shaped). *(Figure 9)* It is always best to take the old (original) terminal connector along with you to the hardware store so that it can be matched with the one to be purchased.

8. When the male terminal spade is used instead of a terminal screw, the wire end must be prepared with a solderless female terminal connector, which may be purchased in any electrical hardware store.

FIG.9 SOLDERLESS TERMINAL CONNECTORS USED WITH TERMINAL SCREWS

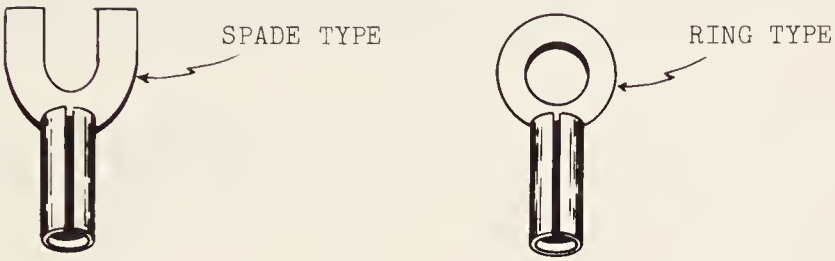
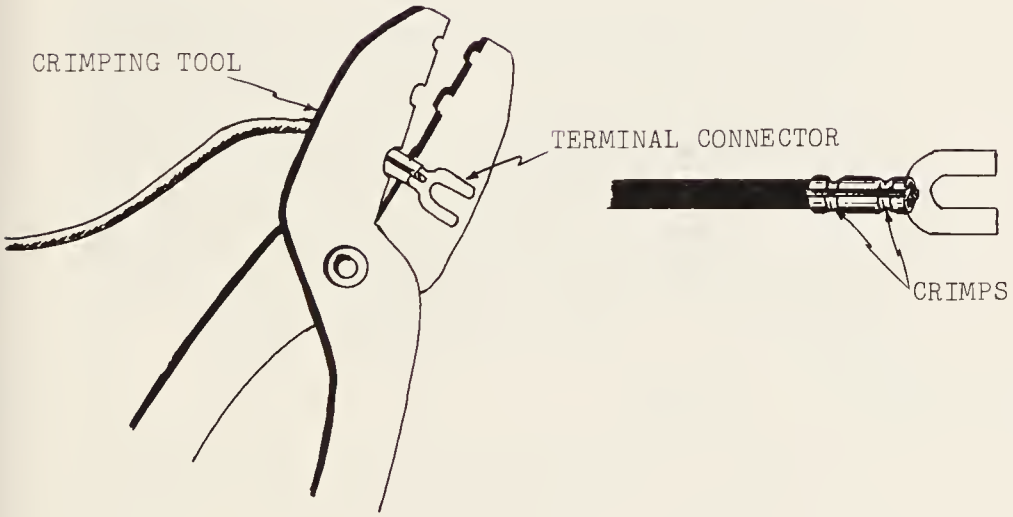


FIG.10

FIG.11



9. To prepare the wire end and to install a female terminal connector, refer to steps 6 and 7 for the necessary procedures.

10. Clean the male terminal spade of any dust or dirt by sanding it lightly with an emery board. *(Figure 12)*

11. Connect the female terminal to the male terminal by pushing it on. *(Figure 13)*

#27 Splicing Wires

HOW TO: Join wires with solderless wire connectors.

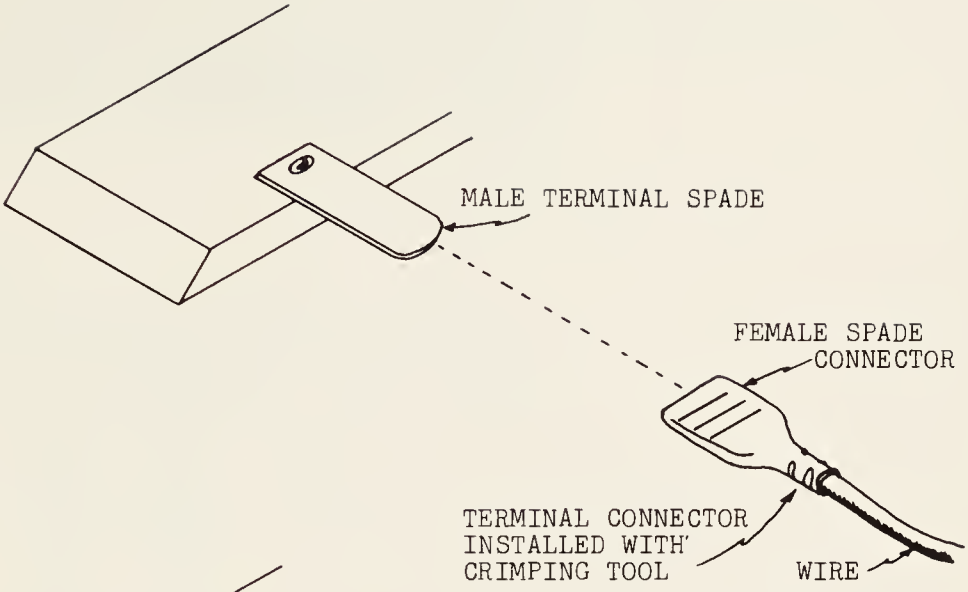
EXPLANATION: In electrical terms the joining of two or more electric wires is commonly referred to as "splicing." When properly made, a splice produces a wire connection that is a good mechanical bond (wires do not come apart) and a good electrical bond (does not obstruct the flow of electricity). The two splicing techniques described in the following steps can be adapted to cover practically all repair situations that require the joining of wires.

TOOLS AND MATERIALS NEEDED:

(a) a sharp paring knife

(b) a solderless sleeve connector
(size to correspond with size of the wires to be spliced)

FIG.12



REMOVE DIRT AND RUST

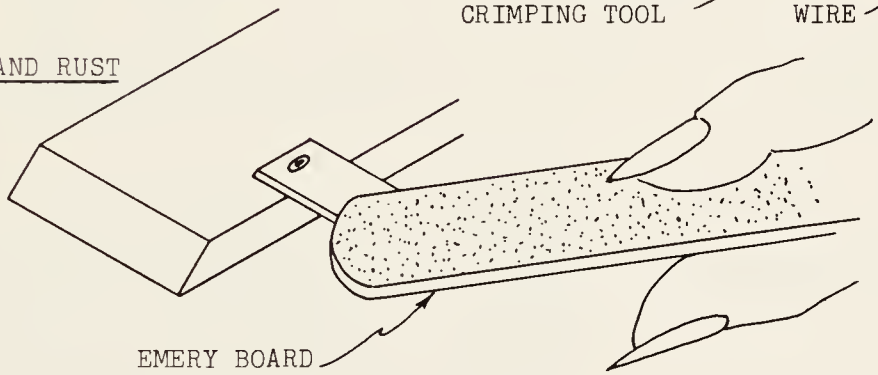
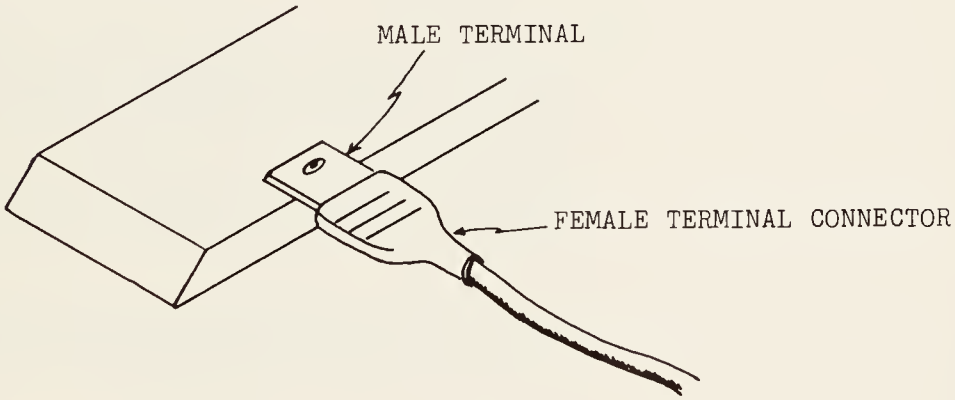


FIG. 13



(c) a length of "spaghetti" insulation (preformed, sleeve-shaped insulating material available in various diameters and lengths from electrical hardware, electronics, or radio-TV repair stores)

(d) a crimping tool

(e) a wire nut, available from local electrical hardware store (size is determined by the size and number of wires being joined)

(f) a small piece of fine sandpaper (1" square)

(g) a pair of pliers

STEPS:

1. Select the type of splice which would best meet your repair need. *(Figures 1 and 2)*

   NOTE: The splice shown in *Figure 1* employs a solderless sleeve connector and is used whenever space and the routing of the wires in the appliance demand a continuous, non-bulky splice. The splice shown in *Figure 2* uses a wire nut (simple to install) and can be used whenever space is not a problem or the insulating protection afforded by the wire nut is needed.

2. To complete the splice shown in *Figure 1,* remove a length of insulation (from each wire end) equal to the length of the solderless sleeve connector to be used. Cut the insulation with a sharp paring knife and pull it from the wire ends. *(Figure 3)*

3. Clean the wire ends carefully by wiping them gently with fine sandpaper.

4. Next, cut a piece of spaghetti insulation twice the length of the solderless sleeve connector. Slip the spaghetti insulation onto one of the wires to be spliced. *(Figure 4)*

FIG.1

FIG.2

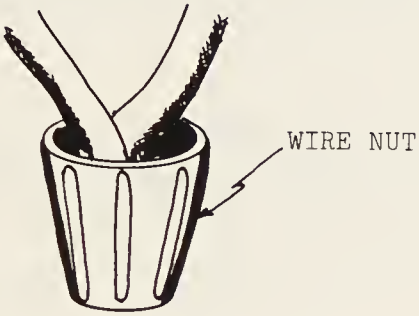
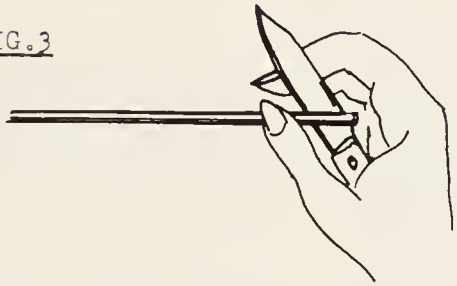


FIG.3



INSULATION BEING REMOVED

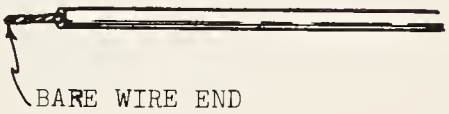


FIG.4

5. Slip both wire ends (from opposite directions) into the sleeve connector. *(Figure 5)*

6. Fasten the sleeve connector to the wires by placing a crimp in the center of the sleeve connector with the crimping tool. *(Figure 6)*

7. Slide the spaghetti insulation into place over the sleeve connector to complete the splice. *(Figure 1)*

8. To complete the splice shown in *Figure 2,* remove about one-half inch of insulation from each wire end with a paring knife. *(Figure 3)*

9. Clean the wire ends with sandpaper. *(Figure 4)*

10. Cross the wire ends *(Figure 7)* and twist wires together with fingers. *(Figure 8)* Complete the twist to the end of the wires with a pair of pliers. *(Figure 9)*

11. Press wire nut onto wire ends and turn nut clockwise until wire nut is securely attached.

    CAUTION: Make certain that the wire nut covers all of twisted wire ends. If not, length of twisted wire ends must be shortened.

    SPECIAL NOTE: Wire nuts are made from plastic or porcelain. Plastic wire nuts can be used in situations in which they will not be subjected to extreme heat. Porcelain wire nuts should be used whenever they are to be exposed to high temperatures.

FIG.5

FIG.6

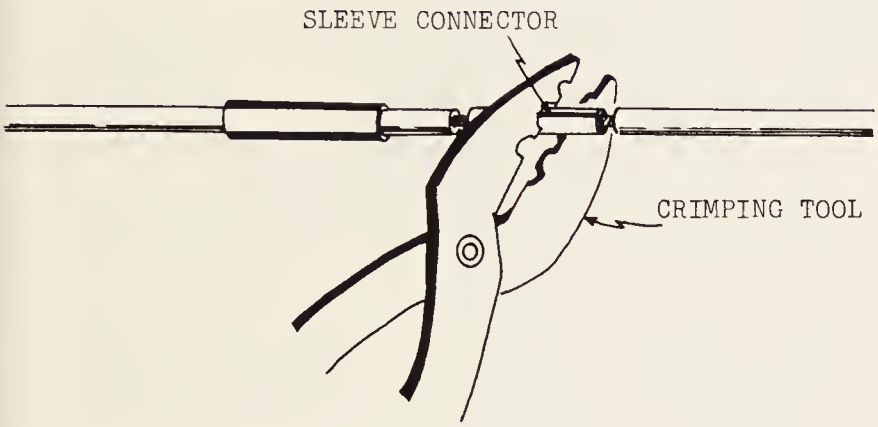


FIG.7

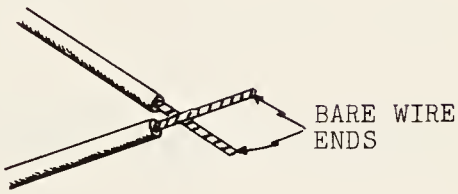


FIG.8

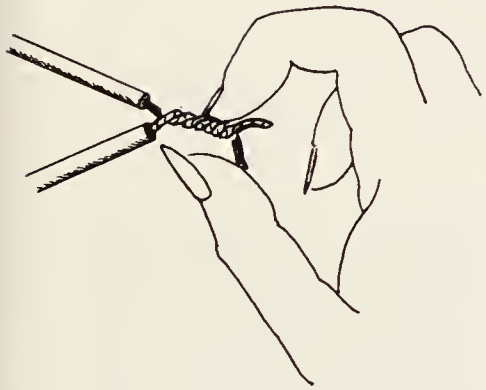
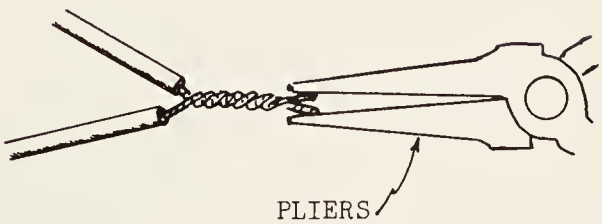


FIG.9



#28 Insulating Wires

HOW TO: Insulate wire.

EXPLANATION: The material (insulation) used to cover electrical wires acts as a barrier to the flow of electricity. Different materials are used to cover wire. In addition to their electrical insulating qualities, these materials must be capable of withstanding the extreme conditions to which they may be exposed in appliances. These conditions include the presence of oil or grease, high degree of heat, and the presence of excessive moisture. Therefore, whenever it becomes necessary to replace wire insulation, the material used must have the same qualities as that of the original covering.

TOOLS AND MATERIALS NEEDED:

(a) a pair of scissors

(b) a roll of ½" wide electrical insulating tape (electrical friction tape, electrical plastic tape, or fiberglass tape) selected according to the specific application.

STEPS:

1. Determine the type of insulating material required.

   NOTE: Electrical friction tape (cloth), electrical plastic tape, and fiberglass tape are three common types of insulating material that are readily available from any electrical hardware store. Moreover, they are easily applied and can fulfill the need for practically every wire repair that requires insulation. Friction tape is a cloth material that contains a black tar-like substance. It can be used for general repair work as long as it is not exposed to extreme heat or moisture. Plastic tape is a strong elastic type material that is extremely useful when-

ever a high degree of electrical insulating quality (without bulk) is required. It is also a very effective insulator against moisture. However, it should not be used when it is likely to be exposed to heat. Fiberglass tape, because of its non-inflammable, heat-proof characteristics, should be used whenever insulation is required in a condition of extreme heat. All of the insulating tapes discussed above are applied in the same manner and are described in the steps that follow.

2. Begin at a point on the wire about one inch from the bare section to be insulated. *(Figure 1)*

FIG.1

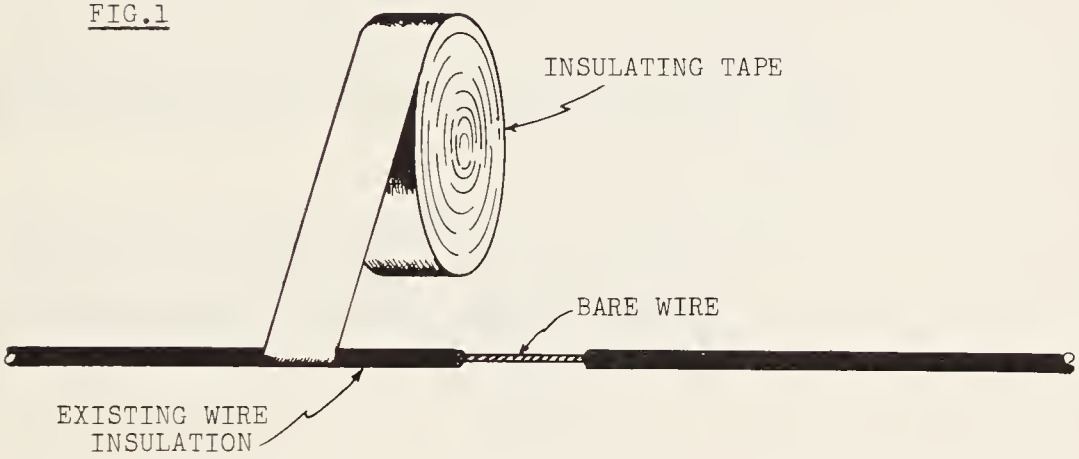


FIG.2

3. Hold the tape at an angle to the wire and wrap tape around wire. *(Figure 1)*

4. Overlap each turn one-half the width of the tape. *(Figure 2)*

5. Continue wrapping tape for at least one inch past the bare wire section to complete one layer of insulation. *(Figure 3)*

   NOTE: Two layers of insulating tape are generally used for added security, whenever the additional bulk thus created does not interfere with the routing (placement) of the wires.

6. Begin wrapping second layer of insulation from the point at which the first layer ended. *(Figure 4)*

7. Continue wrapping (overlap one-half the width of the tape each turn) back to where the first layer began and cut tape with scissors to complete the second layer. *(Figure 5)*

#29 Mending Heating Elements

HOW TO: Mend broken heating element wire.

EXPLANATION: The practice of mending broken (parted) heating element wire is only a temporary measure. It is intended to restore the operation of an appliance for an emergency need, or when a new replacement element is not available from supply sources. When properly mended, however, the life of heating elements can be extended for many years. Rejoining broken (parted) heating element wire requires the use of fastening devices that can withstand the intense operating heat produced by

the element wire. Three methods have proven to be the most effective means of mending element wire. They include the use of a mending sleeve, a nut and bolt, or a blind rivet. The most effective method of the three is the use of the blind rivet because of its tremendous holding power and the fact that it will not become loose. Otherwise, the selection of the type of fastener to be used will depend upon availability and/or the relative ease

FIG.3

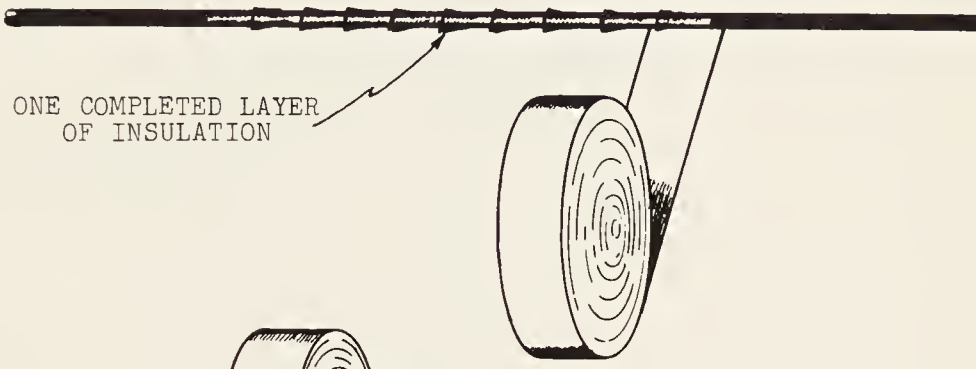


FIG.4

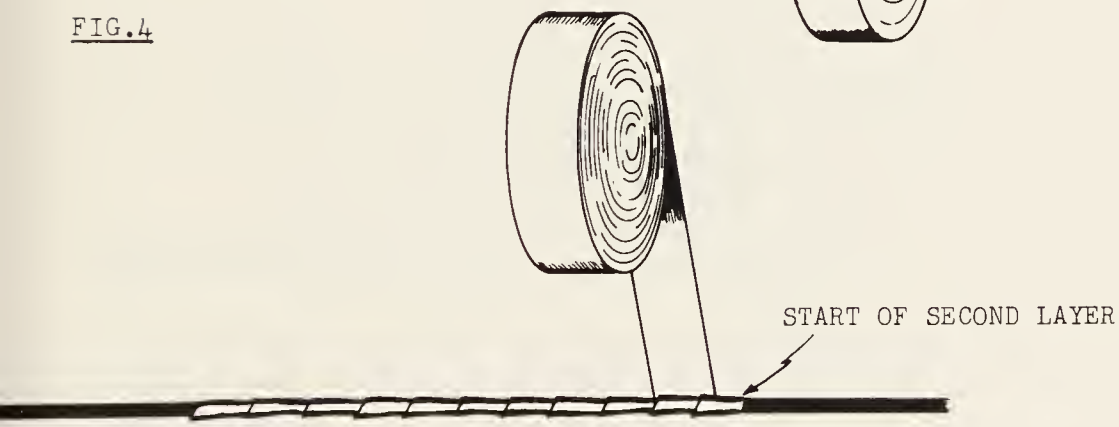
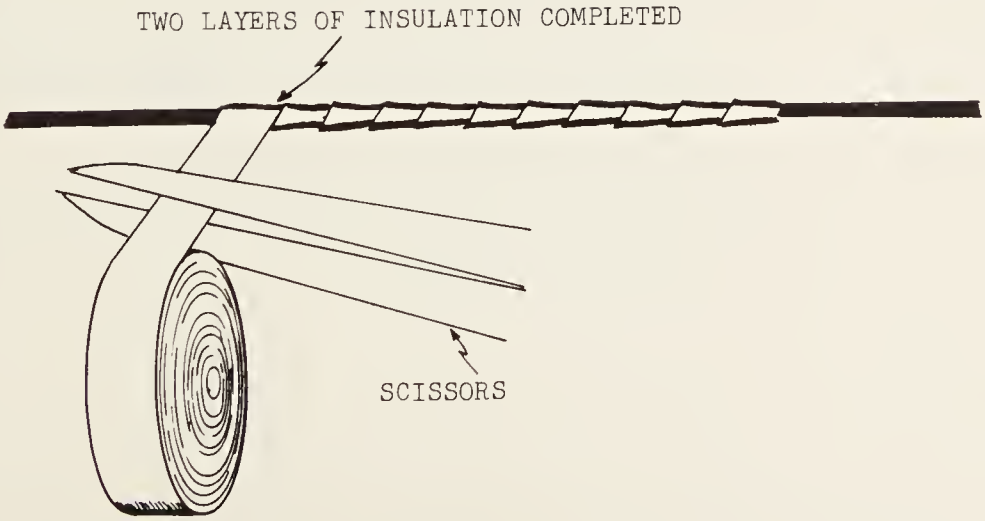


FIG.5



or difficulty of installation. The steps below describe the procedures for employing each of the three fasteners.

TOOLS AND MATERIALS NEEDED:

All materials and tools listed are available from local electrical hardware stores.

Repair Method Employing Mending Sleeve

(a) a solderless sleeve wire connector

(b) a pair of pliers

Repair Method Employing Nut and Bolt

(a) a #6-32 brass nut and bolt

(b) a pair of long-nose pliers

(c) a flatblade screwdriver (medium size)

Repair Method Employing Blind Rivet

(a) a ⅛" diameter × 3/16" grip length steel blind rivet

(b) a back-up washer (⅛" hole) for use with rivet

(c) a blind riveting tool

STEPS:

1. To rejoin broken element wire with a solderless sleeve connector, straighten approximately one-quarter inch of both wire ends with long-nose pliers. *(Figure 1)*

2. Insert the wire ends into the solderless sleeve connector. *(Figure 2)*

FIG.1

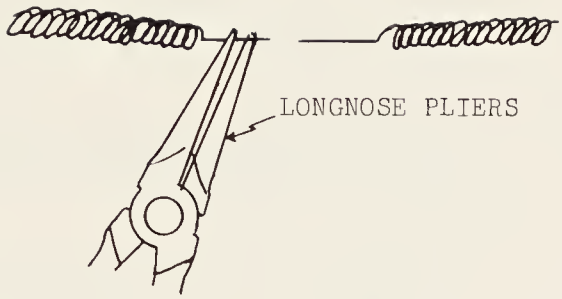


FIG.2

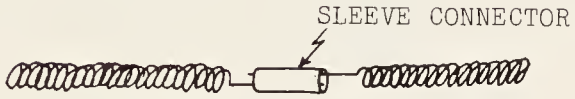


FIG.3

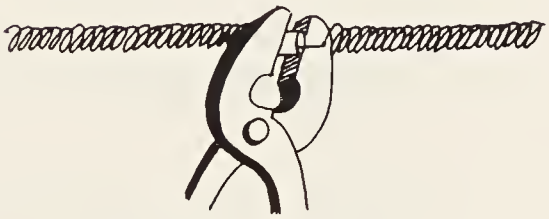
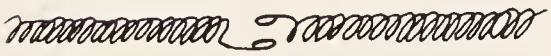


FIG.4



3. Crush the wire connector with a pair of pliers to complete the mend. *(Figure 3)*

4. To rejoin broken element wire with a brass nut and bolt, form both wire ends into loops. *(Figure 4)*

5. Insert bolt through wire loops and thread on the nut. *(Figure 5)*

6. Tighten the nut and bolt securely with a screwdriver and pliers to complete the mend. *(Figure 6)*

7. To rejoin broken heating element wire with a blind rivet, form both ends into loops. *(Figure 4)*

8. Insert rivet mandrel into rivet tool nosepiece. *(Figure 7)*

9. Insert the rivet through the wire loops and place back-up washer on bottom of rivet. *(Figure 8)*

10. Fasten the rivet with the riveting tool. Squeeze the handles of the tool firmly until the rivet mandrel is snapped free of rivet. *(Figure 9)*

11. This completes the mend. *(Figure 10)*

FIG.5

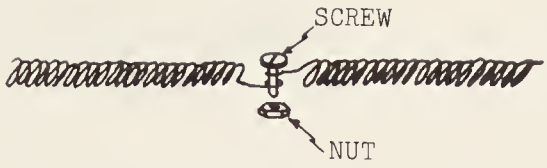


FIG.6

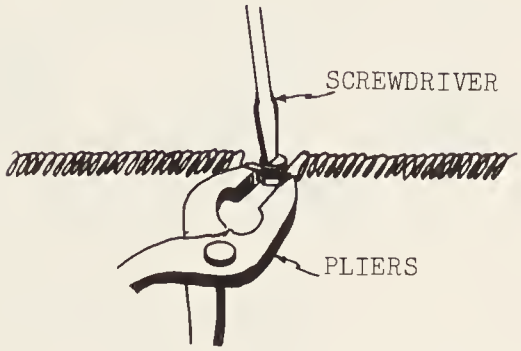


FIG.7

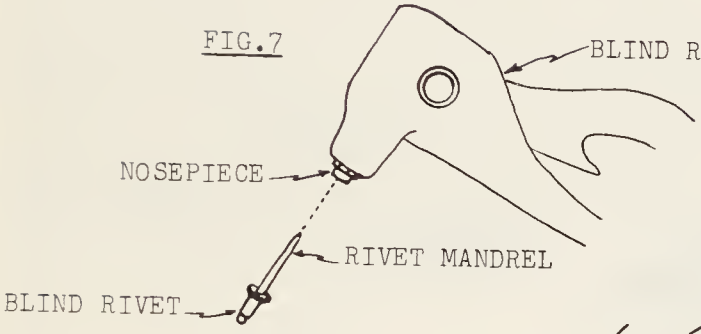


FIG.8

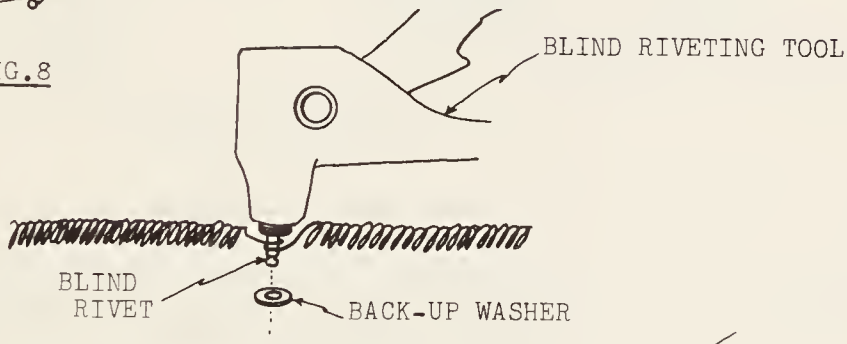


FIG.9

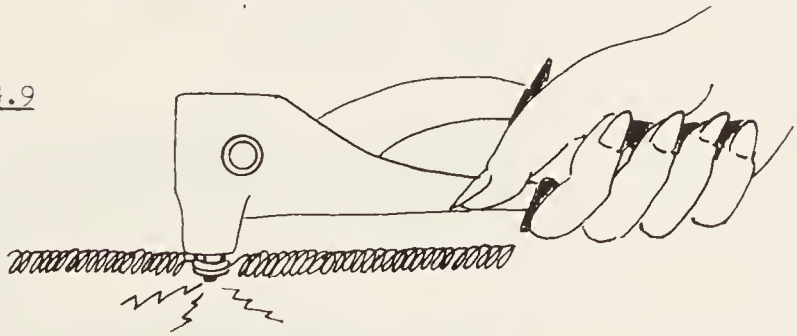


FIG.10

#30 Connecting Heating Elements

HOW TO: Connect heating element wire to a terminal screw.

EXPLANATION: In many appliances, the heating element wires are connected (terminate) directly to a terminal screw. Inspection of an element wire that fails to heat will often disclose that the end of the element wire has burned or broken away from a terminal screw. A good heating element terminal connection must be electrically secure (good conductor of electricity), and it must also prevent the intense operating heat of the element wire from reaching and destroying the terminal screw. The steps below describe a method of reconnecting heating element wire to a terminal screw that satisfies both requirements.

TOOLS AND MATERIALS NEEDED:

(a) a pair of long-nose pliers

(b) a pair of universal pliers

STEPS:

1. Remove the terminal nut by unscrewing it from the terminal screw with the universal pliers. *(Figure 1)*

2. Remove the two metal washers. Make certain that the broken piece of heating element wire located between the metal washers is also removed. *(Figure 2)*

3. Inspect the metal washers and terminal nut. If terminal nut and washers appear badly overheated (blackened or charred), replace them with new ones.

FIG.1

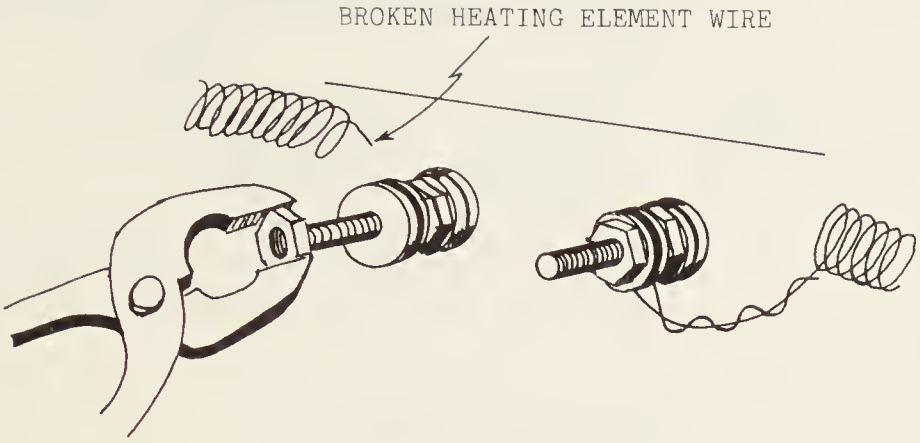


FIG.2

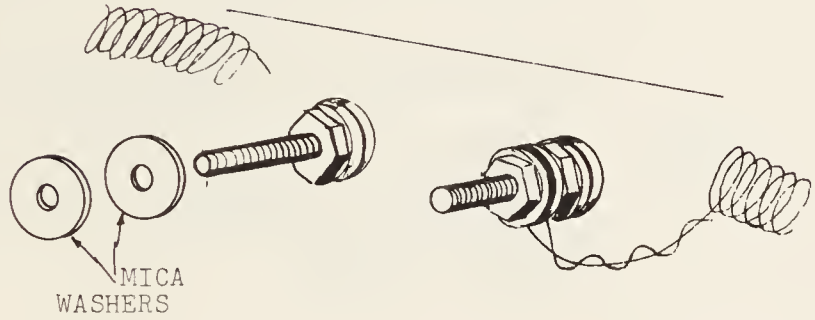
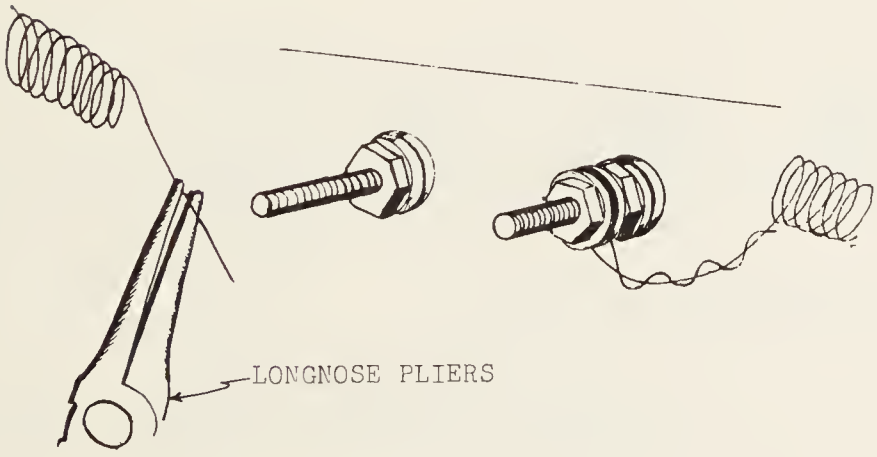


FIG.3



4. Straighten approximately two inches of the element wire end with the long-nose pliers. *(Figure 3)*

5. Replace one washer on the terminal screw.

6. Wrap the element wire one turn around the terminal screw, allowing at least one inch of the wire to extend from the screw. *(Figure 4)*

7. Insert the second metal washer onto the terminal screw. *(Figure 5)*

8. Replace the terminal nut and tighten it securely with the universal pliers. *(Figure 6)*

   CAUTION: Do not overtighten terminal nut. Element wire may be crushed and damaged.

9. Twist the end of the element wire extending out from the terminal screw back over the element wire *(Figure 5)* to complete the terminal connection.

#31 Plastic Knobs

HOW TO: Mend a broken plastic appliance control knob.

EXPLANATION: Appliance control knobs crack most often at a point where they grip the metal shafts of switches.

TOOLS AND MATERIALS NEEDED:

(a) a small tube of plastic cement
(available at hardware stores and children's hobby shops)

(b) a spool of nylon sewing thread

FIG.4

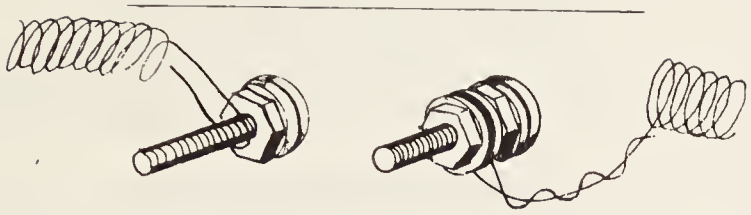


FIG.5

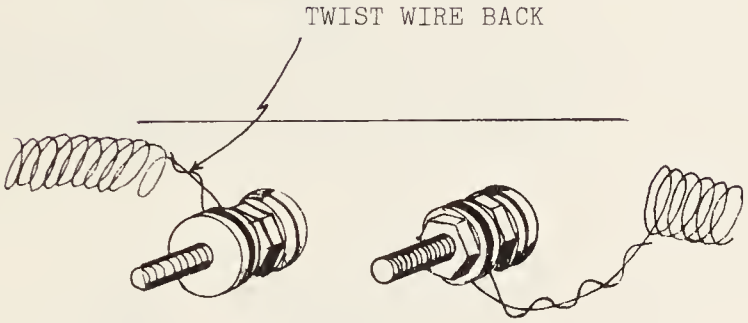
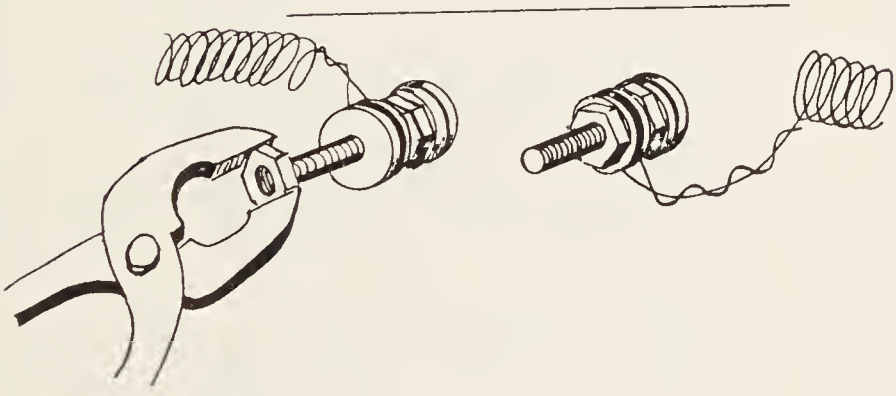


FIG.6



STEPS:

1. Locate small piece of control knob which has been broken off. *(Figure 1)*

2. Carefully apply plastic cement from tube along the edges of the break. *(Figure 2)*

3. Replace the broken piece onto the knob and hold the piece firmly in place until the cement begins to dry (about one minute). *(Figure 3)*

4. Wrap the shaft section of the knob with nylon thread. *(Figure 4)* Make certain thread is pulled tight after each turn. Wind thread as close together as possible.

5. Coat the wound thread with plastic cement. Allow cement to dry thoroughly (about two hours) to complete the mend.

#32 Plastic Parts

HOW TO: Mend cracked or broken plastic appliance parts.

EXPLANATION: The use of plastic materials in the construction of modern appliances is quite extensive. In general, plastic materials have many advantages over some of the metal materials they have replaced. One important advantage is that plastics are good insulators, and when made into appliance parts that are to be handled by the user, they greatly reduce the possibility of electric shock. In normal use, plastic appliance parts can endure as well as most of the previously used metals. Under abnormal conditions, however, such as when an appliance is dropped or struck, plastic components can be cracked or pieces can be broken off.

TOOLS AND MATERIALS NEEDED:

(a) a tube of plastic cement

(b) an epoxy cement kit (transparent)

(c) a small roll of masking tape (¾" wide)

FIG.1

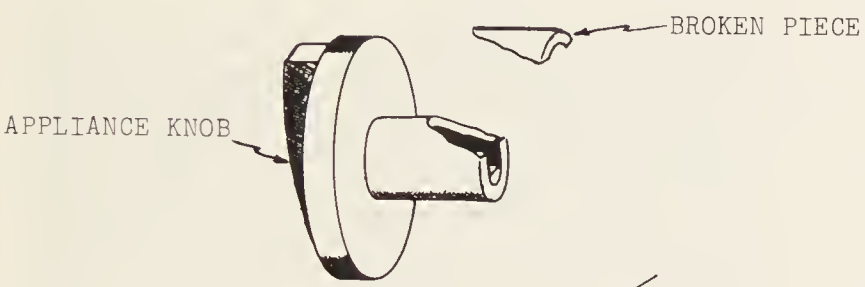


FIG.2

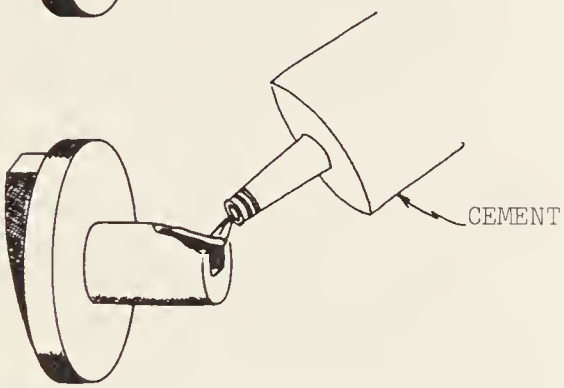


FIG.3

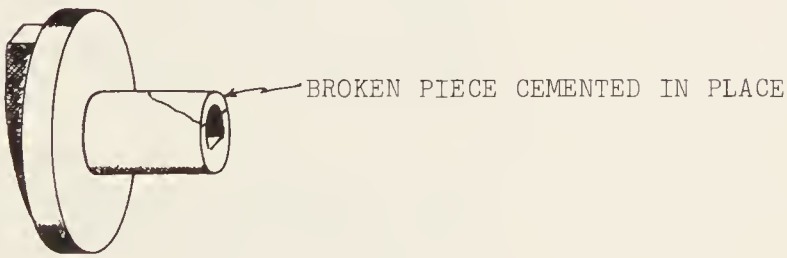
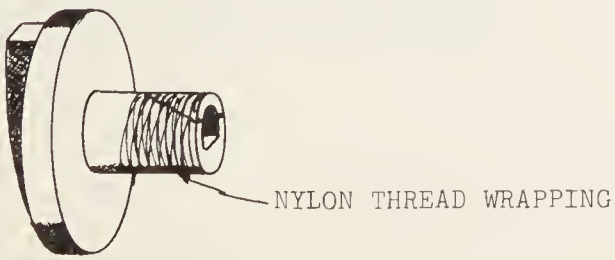


FIG.4



(d) a sheet of fine (#00) sandpaper

(e) a handful of fine steel wool

(f) a tube of toothpaste

(g) a number of wooden toothpicks

STEPS:

1. Determine the type of cement to be used for the plastic repair.

   NOTE: Many types of plastic materials are used for the construction of appliance components. For mending purposes, however, we shall only determine how the particular type of plastic to be mended will respond to the two commonly used types of cement. For some plastics, plastic cement acts as a solvent and rejoins cracked or broken pieces by actually welding them together. There are other types of plastic materials, however, that are not affected by plastic cement. For these it is best to use an epoxy cement.

2. To pretest the effectiveness of plastic cement, apply a small drop of the cement with a toothpick on a portion of the plastic part that cannot normally be seen.

3. Stir the drop of cement with a toothpick. If the plastic surface is softened (gummy) by the cement, it indicates that the plastic cement will work well. If the plastic remains hard, the epoxy cement will have to be used instead.

4. To mend plastic with plastic cement, first make sure that the pieces to be joined are clean. Wash plastic parts with soap and water to remove any oil or grease. Dry thoroughly.

5. Apply plastic cement sparingly along cracked edges of both broken pieces. *(Figure 1)*

FIG.1

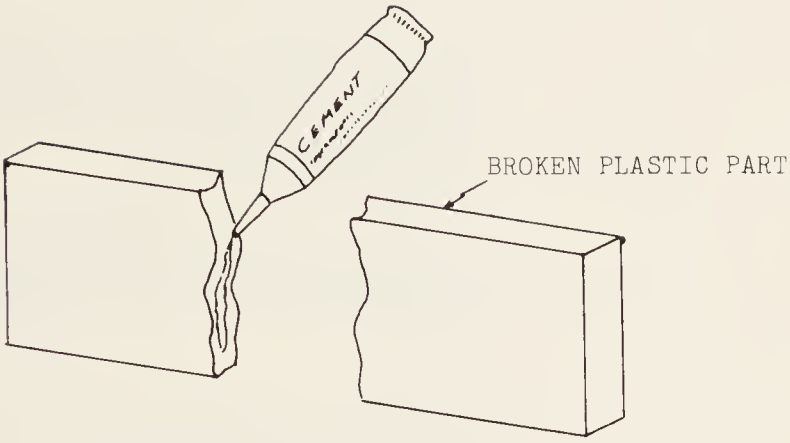
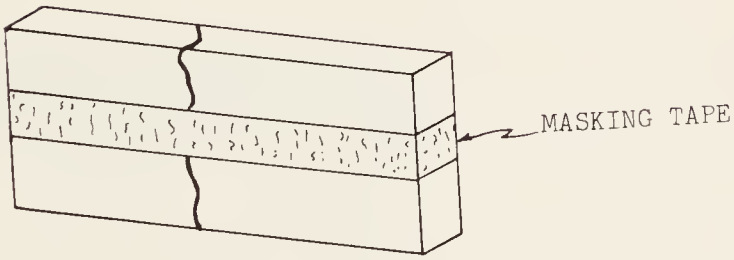


FIG.2



6. Press pieces together firmly and hold them together steadily until cement starts to harden (about one minute).

7. Place a strip of masking tape across (at right angles to) the cemented crack. *(Figure 2)* Pull masking tape taut so that it holds the pieces firmly in place.

8. Allow plastic cement to dry completely (about two hours). Then remove masking tape. *(Figure 3)*

9. Inspect the mend. If mended crack mars the appearance of the appliance, it may be refinished to improve its appearance.

   NOTE: Besides restoring the finish of mended plastic parts, it may also be desirable at times to remove scratches that accumulate through normal use on the surface of plastic parts and to restore their original luster. This may be accomplished by following steps 10 through 13 as outlined in this section.

10. For mended cracks and deep scratches, first smooth the area by rubbing it *lightly* with a piece of fine sandpaper. *(Figure 4)*

FIG.3

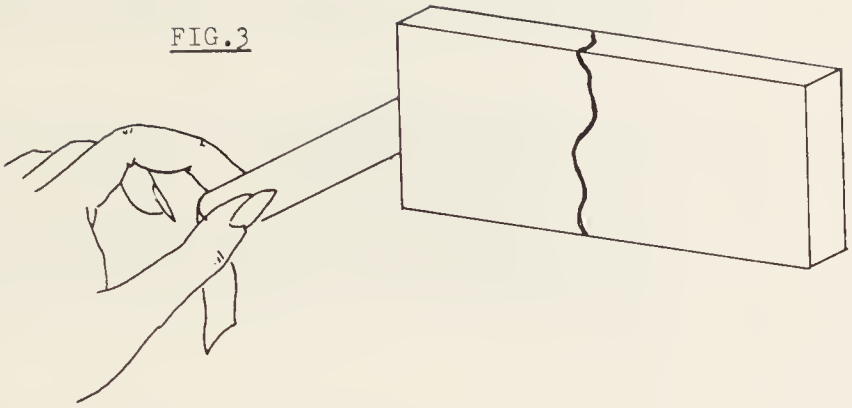
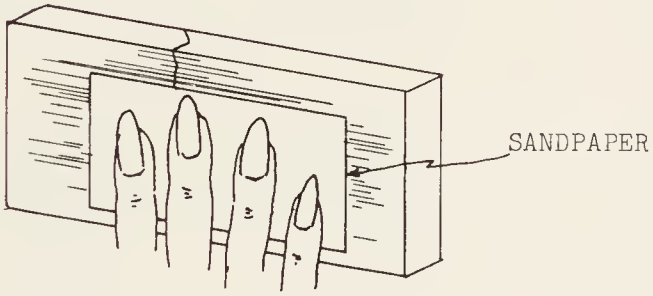


FIG.4



11. After all deep scratches have been removed with sandpaper, form a pad with fine steel wool and rub area with steel wool until all fine scratches left by sandpaper are removed. Area should now take on a smooth but hazy appearance. *(Figure 5)*

12. Thoroughly dampen a piece of soft cloth with water. Fold the cloth into a tight pad. *(Figure 6)* Squeeze about one inch of toothpaste onto the cloth and polish plastic area (rub back and forth in straight, even strokes) until luster is obtained.

13. Wipe toothpaste off with soft, clean, dry cloth and inspect degree of luster obtained. If it is unsatisfactory, repeat polishing with more toothpaste until finish is satisfactorily restored.

14. To mend plastic components with epoxy cement, first clean plastic with soap and water to remove all dirt, oil, or grease.

15. Prepare an adequate quantity of epoxy cement for the repair at hand. *(Figure 7)*

    NOTE: Epoxy cement is supplied in kits containing two ingredients. These ingredients must be mixed in equal quantities just prior to use. Once the two ingredients are mixed, the hardening process begins.

    CAUTION: Use care and avoid unnecessary contact with epoxy ingredients when working with them. Always follow manufacturer's precautions and instructions.

16. After epoxy cement has been prepared, complete the application of the cement and refinishing of plastic surface (if needed) as outlined in steps 5, 6, and 7. However, be sure to allow epoxy cement 24 hours to set (cure) before removing masking tape or trying to restore plastic finish.

FIG.5

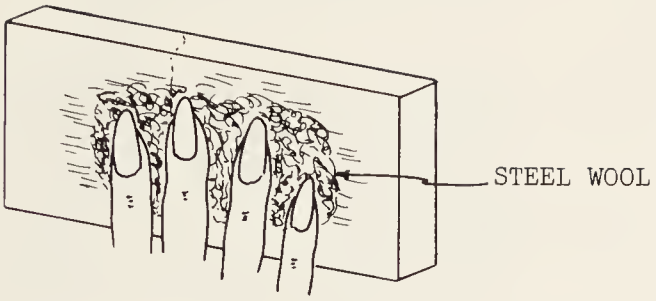


FIG.6

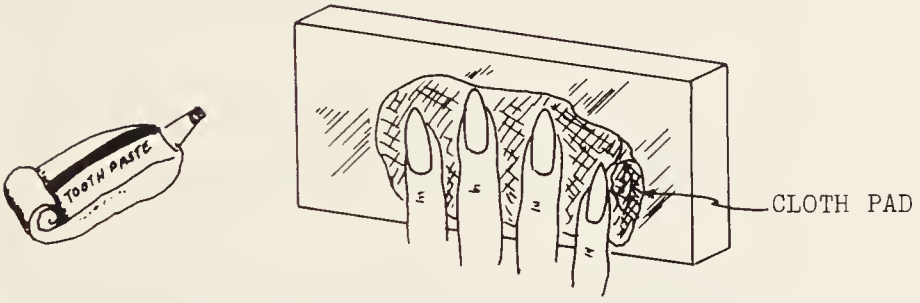
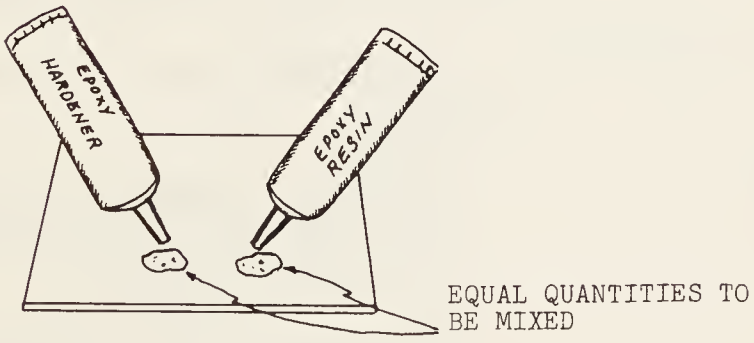


FIG.7



#33 Cabinet Finish

HOW TO: Repair chipped porcelain.

EXPLANATION: Porcelain is used as a finishing material in a number of places on appliances. Because of its glass-like hardness, it does an excellent job of resisting scratches and wear. However, because of its brittleness, it is easily chipped when struck by a hard object with sufficient force.

TOOLS AND MATERIALS NEEDED:

(a) a small can of plastic (ready-mixed) spackling compound

(b) a sheet of very fine sandpaper

(c) a small ball of steel wool (Fine-#00)

(d) a small bottle of appliance "touch-up" paint (available from appliance parts suppliers in colors to match appliance finish)

(e) a putty knife (or butter knife)

SOLUTION:

1. Clean chipped area to remove all oil, grease, or dirt.

2. Carefully fill chipped area with plastic spackling compound applied with putty knife (or butter knife). *(Figure 1)*

NOTE: When porcelain is chipped, a hollow or well is formed in the surface. This well must be filled to provide an even surface before paint can be applied.

FIG. 1

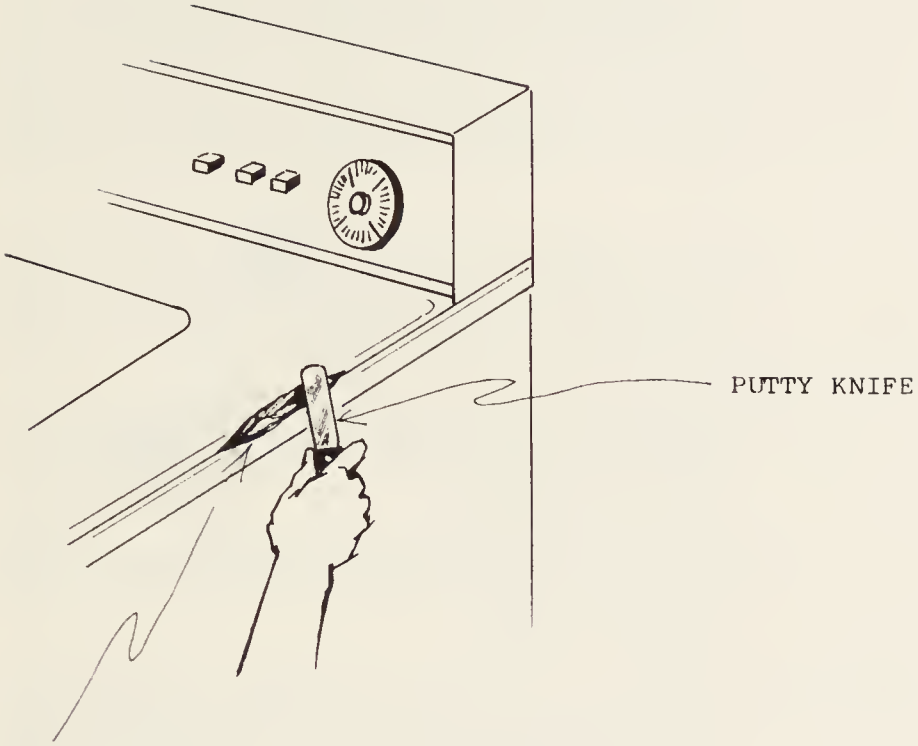
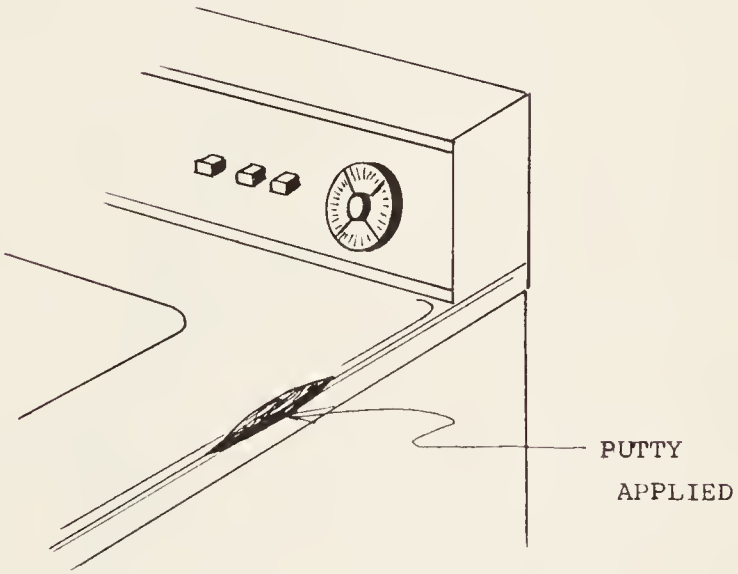


FIG. 2



3. Continue to apply spackling compound until chipped area is filled slightly higher than surrounding porcelain surface. Smooth compound as much as possible. Allow compound to dry thoroughly as directed on can. *(Figure 2)*

4. After compound has hardened, use very fine sandpaper to make compound surface even with porcelain finish. *(Figure 3)*

   CAUTION: Take care when sanding compound surface not to extend strokes onto porcelain finish to avoid scratching it.

5. Finish compound surface by smoothing it with fine steel wool.

6. Apply "touch-up" paint to repaired area only. Use thin, light coat. Allow to dry, then apply second thin coat. *(Figure 4)*

FIG. 3

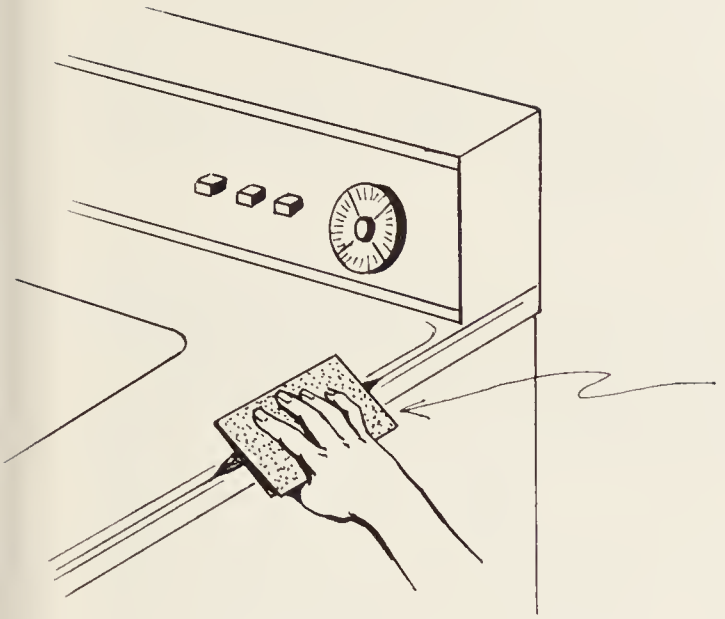
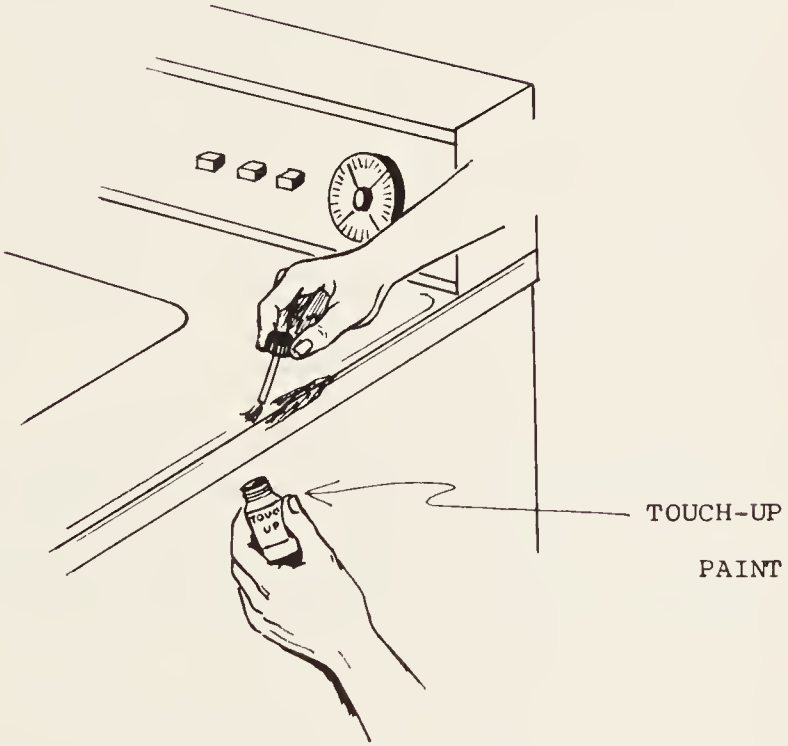


FIG. 4



Glossary of Common Appliance Terms

ABRASIVE Rough object or surface. Sandpaper or emery cloth.
ACCESS PANEL A panel which, when removed, permits a means of approach to mechanism to be checked or replaced.
A.C. CURRENT See ALTERNATING CURRENT.
ADAPTER A device which enables parts of different sizes or design to be fitted together.
AGITATOR A device used to create movement between clothes and washer in the wash basket.
AGITATOR SHAFT The shaft that connects the transmission to the agitator.
AGITATOR-TYPE WASHER A washer that operates in an alternating clockwise and counter-clockwise motion (top loader).
AIR CYCLE In an air conditioner, the complete process of cleaning, cooling, and dehumidifying the room air.
AIR FILTER The component of an air conditioner that traps and removes lint, dust, etc., from the room air.
ALIGNMENT Proper positioning of a component in relation to other parts or assemblies.
ALLEN SCREW A screw having a hexagonal (six-sided) hole in its head.
ALLEN WRENCH A wrench for allen screws having a hexagonal bar.
ALTERNATING CURRENT Current that flows in one direction and then reverses itself and flows in the opposite direction.
AMPERE A unit of measurement of electric current.
APPLIANCE An electrically operated piece of equipment used in a home for performance of domestic chores. A labor-saving device.
ASSEMBLY A part made up of two or more components or smaller parts.
AUTOMATIC Self-moving from operation to operation.

BASKET (SPIN) Inner tub of a washing machine.
BEADING Water beads, formed on glassware because of poor washing action of a dishwasher. Result is spotted glassware.

BEARING (BALL) A friction-reducing device constructed of metal balls encased in a racer between two ring bands.

BEARING (SLEEVE) A friction-reducing device constructed with anti-friction material. A graphite-impregnated bronze bushing.

BELT ("V") A "V" shaped, endless flexible band passing over two or more pulleys to transmit power from one to another. The "V" sides of the belt fit into and conform to the tapered sides of the pulley.

BOOT Rubber sleeve covering used as a seal to prevent water leakage.

BUSHING See BEARING (SLEEVE).

CAM An eccentric (off-center) disc arrangement which changes rotary motion to a reciprocating (to and fro) motion.

CENTER POST The post that supports the spin basket and/or spin tube.

CHASSIS The supporting framework of an appliance.

CIRCUIT BREAKER A device, other than a fuse, for interrupting a circuit under infrequent, abnormal conditions. Used to protect electrical components against an overload or a short circuit in an electrical system.

COLD CONTROL Thermostat used to automatically control the temperature in a refrigerator or freezer.

COLLECTOR TUB Outer tub of a washing machine.

COMPONENT A part that helps to make up something larger than itself, usually an assembly.

COMPRESSOR The motor-pump assembly that operates the refrigeration system of an air conditioner, refrigerator, or freezer.

CONDENSATE Water removed from the room air by an air conditioner.

CONDENSER The hot coil of a refrigerator, freezer, or air conditioner that gives up the heat removed from inside the refrigerator or room to the outside air.

CONDUCTOR A material that allows electricity to pass through it easily.

CONTINUITY (ELECTRICAL) A complete path for electricity to flow.

CONTINUITY TESTER Used to test electrical continuity. It may be either a lamp type tester or an ohm meter.

CONTROL Any device used for regulating and guiding the machine through an operation.

CORBIN CLAMP Spring type hose clamp.

CORBIN CLAMP PLIERS Tool used to remove and replace corbin clamps.
CRIMPING PLIERS Tool to attach solderless terminals on wire ends.
CURRENT (ELECTRICAL) Movement of electrons.
CYCLE Sequence of operations which repeats itself.
CYLINDER Tub used in tumbler type washer.

DEFROST Process of removing frost (ice) from refrigerator or freezer compartments.
DEFROST HEATER A heating element used in refrigerators to quickly melt frost during the defrost cycle.
DISPENSER Device programmed by the timer to automatically inject washing, rinsing, or bleaching agent.
DIVERTER VALVE Solenoid-operated valve used in suds-saver type washing machine to route drain water to either facilities or storage tub.
DRAIN HOSE Hose used to carry drain water.
DRAIN SYSTEM Components necessary for water evacuation, consisting of tub, pump, and hoses.
DRAIN TUB See COLLECTOR TUB.
DRIP RAIL A trough-like component used in a refrigerator to catch and channel defrost water to a drain.
DRIP RAIL HEATER A heating element used in a refrigerator to warm the drip rail to prevent defrost water from refreezing and thus blocking its flow.
DRIVE BLOCK A tapered part of a washing machine securely attached to agitator shaft. When the agitator is fitted firmly on the drive block, the drive block and agitator move as one.

ECCENTRIC An off-center device that changes rotary motion to a reciprocating (backward and forward) motion.
ELECTRIC CIRCUIT Complete path of electric current.
ELECTROMAGNET A temporary magnet constructed of a coil wire and an iron core. A magnetic field is produced about the coil when current is allowed to flow through it.
ENERGIZED SOLENOID Electric current passing through solenoid coil, creating a magnetic field.
EVAPORATOR The coil or plate in a refrigerator, freezer, or air conditioner.
EXHAUST DUCT Metal or plastic tubing that carries air discharged from an appliance.
EXHAUST HOOD Device used at the end of an exhaust duct

to prevent backdrafts and rain from entering exhaust duct systems.

EXHAUST OUTLET Opening in an appliance from which air is discharged.

FILTER BASKET Screening receptacle designed to trap and remove lint from recirculating wash water in a washing machine.

FLOW CONTROL WASHER Washer with a flexing orifice used to control inletting water pressure in washing machines and dishwashers.

FLUME A trough used to channel inletting water flow in a clothes washer.

FROST-FREE Types of refrigerators and freezers that do not allow frost to form in either the refrigerator or freezer compartments.

FROST Moisture in the air that freezes into ice.

GASKET Soft material (cork or other compressible material) placed between two metal edges to form a seal.

GAUGE A standard of measurement for denoting wire sizes or any instrument used to measure pressure.

GEAR TRAIN Two or more engaging gears.

GRAVITY DRAIN Water flowing from a high to lower elevation without the use of a pump.

HEX-HEAD BOLT A bolt that has a six-sided head.

IDLER PULLEY Movable pulley made to press on a drive belt in order to provide tension or guide the belt.

IMPELLER The turbine or blade component of pump that moves water in a washing machine or dishwasher.

INLET VALVE Controls water entering washing machines and dishwashers.

INNER LINER The inside surface of a refrigerator or freezer cabinet.

INSULATOR (ELECTRIC) A material that prevents the flow of electricity.

INSULATION (NON-ELECTRIC) A material that prevents the transfer of heat.

KINKED HOSE Sharp bend in hose which will restrict the flow of liquid or air.

LEVELERS Adjustable flat-bottom bolts used to keep appliances level.
LINKAGE A device that transfers control motion from one point to another in an assembly.
LINT FILTER A system used to remove lint from recirculating wash water in a washing machine.
LINT SCREEN Fine wire or fiber mesh used to trap lint in a clothes dryer.
LOCK NUT A nut used to prevent the movement of an adjustment screw.

MAGNETIC COIL Coil of wire that creates a magnetic field when current passes through it.
MECHANICAL ETCHING Scratches or chips on glassware caused by improper loading of dishwasher, when glasses are allowed to rub together during the washing cycle.
MECHANISM Assembly of moving parts performing complete functional motion, i.e., transmission, timer, etc.
MICRO-SWITCH Any variety of mechanically operated switches which can be activated with a small operating force.
MIXING VALVE Water inlet valve having two or more inlet ports. Used in washing machines to automatically change inletting water temperature.
MOTOR PROTECTOR See OVERLOAD PROTECTOR.

NESTING An improper loading condition that blocks water action in a dishwasher. It is caused by placing dishes into or too close to each other.
NUTDRIVER A tool used to remove and relace hexagonal head nuts or screws. (See drawing in Figure 6, page 77)

OPEN DIAPHRAGM CONTROL Water-fill level control, activated by water pressure.
"O" RING A shaft seal shaped like the letter "O."
OSCILLATE Move to and fro, from one side to another.
OVERLOAD PROTECTOR Circuit breaker that prevents possible damage that may be caused by excessive amperage or temperature rise.

PACKING Material used to form a water seal around a shaft.
PLASTIC AIR TUBE Small diameter tube that contains a column of air used to operate closed-diaphragm type pressure fill controls in washing machines.

PRESSURE SWITCH In a washing machine, an electric switch that is activated by the pressure exerted by either water or air.
PULSATING ACTION An up-and-down agitation action.
PUMP (WATER) Device used to raise water from a lower level to a higher level.

REDEPOSITION Soil that is redeposited on dishware or tub walls after washing. Usually caused by improper rinsing action of a dishwasher.
RESISTANCE (ELECTRICAL) Opposition offered to the flow of current.
ROTARY TIMER A washer timer that employs cam discs to activate its switches.
ROTOR In an AC motor, the rotating part of the motor.

SELF-DEFROST Types of refrigerators that automatically remove frost that has formed in the refrigerator compartment.
SHROUD An enclosure surrounding a fan, used to channel the air flow.
SIPHONING HOSE Device used to extract water from washer when pump is inoperative.
SNUBBER Friction device used to stabilize the outer tub in a washing machine during spin periods.
SOFT-WATER ETCHING A chemical reaction caused by soft water and too much detergent that permanently bonds a film to glassware.
SOLENOID A coil of wire used as an electromagnet.
SOLENOID ARMATURE Moving part of a solenoid assembly.
STATOR WINDING Stationary windings of an AC motor.
SUDS LOCK An excess of suds that restricts the operation of a washing machine or dishwasher.
SUPERSTRUCTURE A clutch, brake, and spin tube assembly mounted on top of the transmission of a popular type washer.
SUSPENSION ROD Used to suspend transmission of a washer.

TIMER Cycle periods controlling device. Driven by an electric motor.
TIME FILL Water volume and/or level controlled by timer.
TIMER KNOB Used to set timer. Also indicates cycle periods.
TRANSMISSION Mechanical unit that provides a means for transmitting and increasing the driving force of the main motor. Also known as a gear case.

UNI-COUPLE A device for connecting a portable dishwasher to a water faucet.

VOLT The unit of measurement of electromotive force.

WATER RESTRICTOR See FLOW CONTROL.

WATT The unit of measure of electric power—the product of a volt and an ampere.

WIRING HARNESS Current carrying wires secured (cabled) together.

Glossary of Tools

SMALL FLATBLADE SCREWDRIVER

PHILLIPS TYPE

MEDIUM FLATBLADE SCREWDRIVER

LARGE FLATBLADE SCREWDRIVER

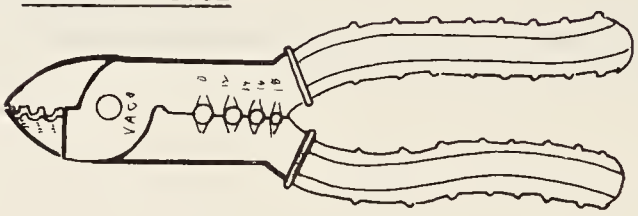
LONG NOSE PLIERS

DIAGONAL CUTTING PLIERS

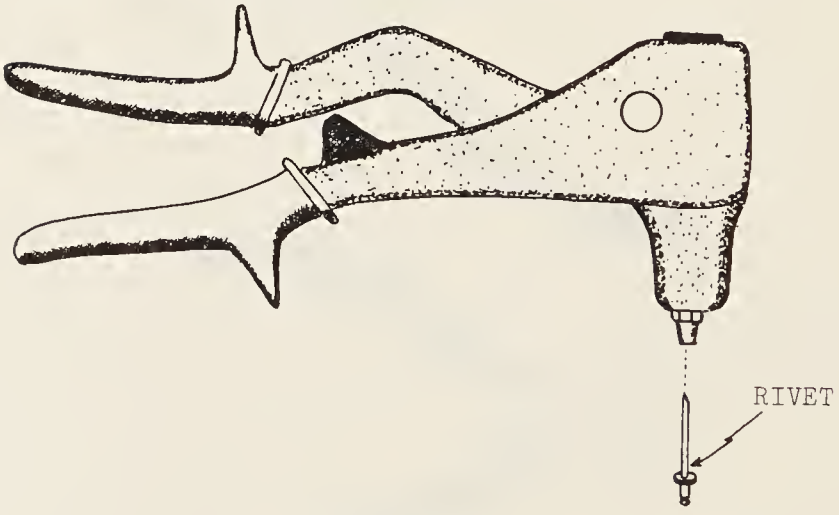
GLOSSARY

UNIVERSAL PLIERS

CRIMPING TOOL



BLIND RIVETING TOOL



ABOUT THE AUTHOR

Michael Squeglia is a teacher of appliance repair at the secondary level of the New York City public school system. He organized the first course of study in this field for the New York City Board of Education. Working with industry, he developed innovative curricula in manpower programs designed to train appliance technicians.

Mr. Squeglia acquired his practical knowledge in 1947 when he began work as a radio-TV-appliance technician and later as an operator of his own service shop in the New York metropolitan area.

He is the author of numerous other books including *All About Repairing Small Appliances, Automatic Washers, Room Air Conditioners, Electric Dryers and Dishwashers,* each prepared for the National Appliance Radio TV Dealers Association (N.A.R.D.A.).

ALL ABOUT REPAIRING MAJOR HOUSEHOLD APPLIANCES

Among the appliances and problems illustrated, described, and handled in this volume are:

CLOTHES WASHERS
- Hot or cold water flow is too slow
- Water does not enter tub during "FILL"
- Water does not enter tub; machine does not agitate or spin
- Control knob does not advance timer manually

REFRIGERATORS AND REFRIGERATOR-FREEZERS
- Frost in refrigerator compartment does not defrost properly
- Interior light does not come on
- Water accumulates in bottom of refrigerator compartment
- Temperature too warm at normal setting

CLOTHES DRYERS
- Dryer runs but clothes do not dry
- Dryer drum turns but no heat is produced
- Clothes do not dry to desired dampness

ROOM AIR CONDITIONERS
- Water leaks into room
- Ice forms behind the front grille
- Excessive noise during operation
- Room(s) not cooled enough

AUTOMATIC DISHWASHERS
- Some dishes do not come clean
- Glassware is damaged during washing
- Water leaks from door

In addition, general repair procedures involving fuses, circuit breakers, plugs, terminals and wire connectors, splicing and insulating wires, mending and connecting heating elements, plastic knobs and parts, and cabinet finish are described and illustrated.

Plus: Glossary of common appliance terms and glossary of tools

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